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4 August 1999

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Integrated Advanced Microwave Sounding Unit-A
(AMSU-A)
Performance Verification Report
Antenna Drive Subsystem
METSAT AMSU-A2 (PN: 1331200-2, SN: 108)

Contract No. NAS 5-32314
CDRL 208

Submitted to:

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Submitted by:

Aerojet
1100 West Hollyvale Street
Azusa, California 91702

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AMSU-A VERIFICATION TEST REPORT

TEST ITEM: METSAT AMSU- A2 ANTENNA DRIVE
                              SUBSYSTEM
                              PART OF P/N: 1331200-2
                              SERIAL NUMBER: 108

LEVEL OF ASSEMBLY: SUBASSEMBLY AND COMPLETE INSTRUMENT
                              ASSEMBLY

TYPE HARDWARE: FLIGHT

PROCEDURE NO: AE-26002/2E

TEST COMPLETION DATE: 22 APRIL 1999

TABLE OF CONTENTS

1.0   INTRODUCTION

The antenna drive subsystem test was performed on the METSAT AMSU-A2 S/N 108 (P/N 1331200-2) instrument. The objective of the test was to demonstrate compliance with applicable paragraphs of AMSU-A specification S-480-80 when tested using AE-26002/2E. Tests were conducted at both the subassembly and subsystem (instrument) level.

2.0   SUMMARY

The performance verification tests include 1) scan motion and jitter, 2) pulse load bus peak current and risetime, 3) resolver reading and position error, 4) gain and phase margin and 5) operational gain margin.

Subassembly tests are performed on the drive assembly, compensator assembly, circuit card assemblies (CCAs), signal processor and the transistor assembly. The transistor assembly was tested during the W3 cable assembly (1356946-1) test. Refer to Figure 1 for test flow.
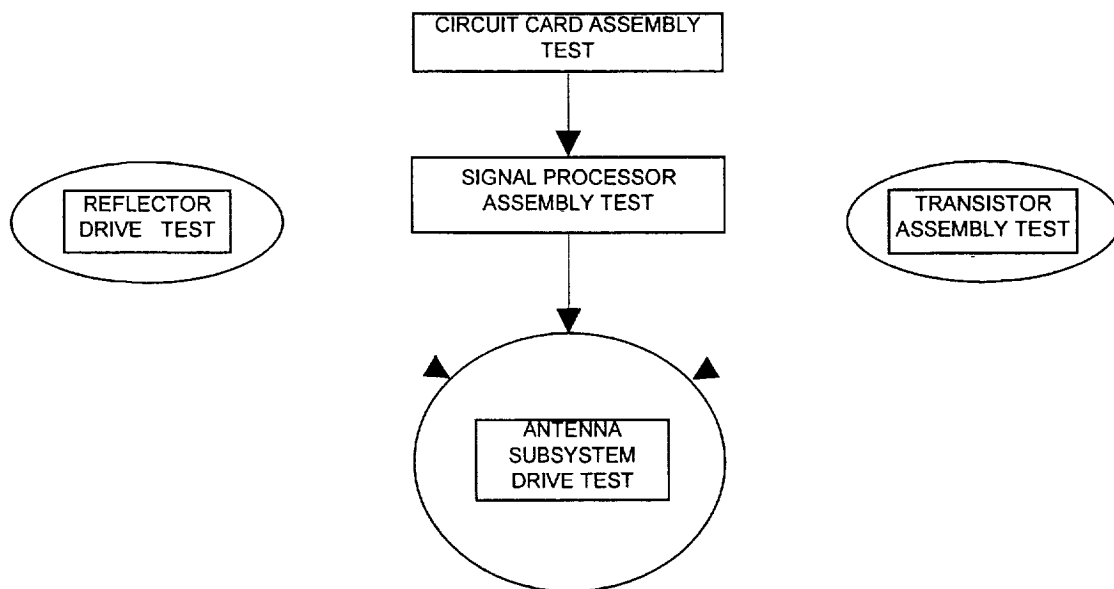
Antenna Subsystem and Subsystem Component Test Flow
Figure 1.

The antenna drive subsystem satisfactorily passed all tests to verify the performance requirements. There were no failures in any of the antenna drive components during subsystem testing. There were several anomalies during subassembly testing. Refer to paragraph 5.0 for a discussion of test results.

3.0   TEST CONFIGURATION – SUBASSEMBLIES

Subassemblies are tested using a variety of test fixtures as required to perform the necessary tests.

Drive Assembly – Prior to complete buildup of this assembly, a starting torque test is performed on the rotating part of the assembly. The test is performed at temperatures of 23, 4, and –10 °C. The tests performed on the completed assembly are 1) motor commutation, 2) resolver operation and no-load speed, 3) temperature sensor resistance and output voltage and 4) random vibration. Motor commutation and resolver operation and no-load speed are repeated after vibration.

Compensator Assembly – The tests performed on this assembly are 1) motor commutation, 2) temperature sensor resistance and output voltage and 3) random vibration. Motor commutation is repeated after vibration.

CCAs – All CCAs are tested prior to being incorporated into the signal processor. They are tested to verify functionality and the derived performance requirements.

Signal Processor – Part of the signal processor test is associated with the antenna drive subsystem. The test includes all applicable CCAs installed in the signal processor card cage, the STE with the associated cabling to the signal processor, and a test motor and inertia wheel to simulate the antenna drive motor and reflector load. This test demonstrates that all signal processor scan drive circuitry is functioning as a subsystem prior to assembly into the instrument. During the tests, qualitative reflector position for the various scan modes is verified by visually observing an index mark on the inertia wheel.

Transistor Assembly – The W3 cable is first tested on the CKT 1000 (continuity and hi-pot tester). The transistor assembly is then mated with the W3 cable, and tested using a special test fixture. The test assures that the transistors saturate when turned on, and that they turn off.

4.0   TEST CONFIGURATION – SUBSYSTEM

The antenna drive subsystem tests are performed after all of the scan drive subassemblies are assembled into the instrument, and the subsystem is tested in accordance with AE-26002/2 during system integration. At the beginning of system integration testing, the instrument is first proven electrically safe by ground isolation and power distribution checks. The instrument is supplied with 28 Vdc from the STE, and the DC-DC converter is installed to supply the other required voltages to the CCAs.

The tests performed to verify performance are 1) scan motion and jitter, 2) pulse load bus peak current and risetime, 3) resolver reading and position error, 4) gain and phase margin and 5) operational gain margin. In order to verify scan motion and jitter, it is necessary to obtain real time measurement of the drive assembly shaft position. This is done by using a continuous rotation potentiometer (pot) mechanically coupled to the drive assembly shaft, and connecting a source of dc voltage across the pot. The voltage at the pot wiper then gives a voltage analog of shaft position for each revolution of the shaft.

Prior to the performance verification tests, there are five operations performed. These are described as follows:

1.   An EPROM is programmed with the reflector position commands (14-bit digital words) which are calculated from the nadir position obtained on the antenna range. This PROM is one of the components on the memory board in the signal processor, and it is under microprocessor control for positioning the reflector. Reprogramming may be necessary if the measured reflector positions are not within the specified limits. (See 5.5.3).

2.   After obtaining the PROM, the instrument is powered, and scan motion is qualitatively checked to conform to the pattern as shown in Appendix B1.

3.   The motor (drive and compensator) current limits are set with select at test (SAT) resistors.

4.   The individual steps in the scan are tailored for risetime, overshoot and jitter with SAT resistors which are part of circuits in the rate loop.

5.   The mechanical resonant frequencies of the drive assembly and reflector are identified. They are then nullified by selecting the appropriate frequencies for three notch filters.

The antenna drive subsystem subassemblies designated for use in the METSAT AMSU-A2 S/N 108 instrument are shown in Table 1.

CCAs	S/N
Resolver Data Isolator	F33
Interface Converter	F25
Motor Driver 3-Hall Sensor	F03
Motor Driver 3-Hall Sensor	F02
R/D Converter/Oscilator	F11

OTHER	S/N
Antenna Drive Assembly	F07
Compensator Assembly	F05
Signal Processor	F04
Transistor Assembly (W3 Cable)	NONE

Table 1. A2 108 Subassembly S/N

5.0   TEST RESULTS

The test results for the subassemblies are first presented in paragraphs 5.1 through 5.4. The subsystem test results are presented in 5.5.

5.1   DRIVE AND COMPENSATOR ASSEMBLIES

During electrical test of the F07 drive assembly, the motor would not start (TAR 003199). Disassembly and inspection revealed that excessive bonding material resulted in bonding of the shaft and cover. The excess material was removed, and the area was cleaned. Step 20 of MAI 32 was revised to clarify the quantity and placement of bonding material. The unit then passed electrical test.

During electrical test of the F05 compensator assembly, the motor would not start (TAR 003124). Disassembly and inspection revealed that the Hall effect sensors had been broken off from the circuit board. It was determined that this occurred during assembly when the temporary spacers between the rotating assembly and stator were being removed. The number of spacers was reduced, and their placement was changed to preclude this happening again. The Hall sensor board was replaced, and the unit passed electrical test.

5.2   CCAs

There were no test anomalies or failures during testing of the CCAs for this instrument. The test data sheets (TDSs) for the CCAs are presented in Appendicies A1 trhrough A4.

5.3   SIGNAL PROCESSOR

There were no test anomalies or failures during the scan drive part of the testing of the signal processor for this instrument.

5.4   TRANSISTOR ASSEMBLY

There were no test anomalies or failures during testing of the transistor assembly for this instrument.

5.5   ANTENNA SUBSYSTEM

There were no test anomalies or failures during testing of the antenna drive subsystem for this instrument. A discussion of test results is given in paragraphs 5.5.1 through 5.5.5.

5.5.1   SCAN MOTION AND JITTER

In this test, the antenna position is measured in a series of five full scans. The measurement was made with the continuous rotation test pot temporarily affixed to the motor shaft. A Dynamic Signal Analyzer (DSA) is connected to the pot wiper to record the antenna position. Five scans were captured and stored on the AMSU-A2 Test Data File disc. One representative pattern is presented in Appendix B1.

Each 3.33 degree scene step was expanded in order to verify risetime, overshoot and jitter. The risetime limit is 42 ms, the jitter limits are ± 5 % and the overshoot limit is 4 % above the upper jitter limit. The expanded waveforms were plotted and are presented in Appendicies B2 through B59. All of the scene steps meet the step response requirements.

Slew periods to the cold and warm calibration stations were measured and met requirements. A time of 0.21 s is allowed for the 35 degree slew to cold cal, and 0.4 s for the 96.67 degree slew to warm cal. Calibration station jitter is less than the ± 5 % maximum allowed. Expanded waveforms were plotted and are presented in Appendicies B60 and B61. The waveforms are also stored on the AMSU-A2 Test Data File disc. The test data sheet is presented in Appendix B62.

5.5.2 PULSE LOAD BUS PEAK CURRENT AND RISE TIME

The peak current must be less than 2 A at any beam position along the scan, and it was measured to be 1.988 A. The current risetime while transitioning from one beam position to the next, and the risetime at the start and stop of the slew to warm cal position must be greater than 70 μs. One 3.33° step was selected, and the risetime is 2.34 ms. For the slew to warm cal, the times are 2.43 ms and 2.34 ms for start and stop respectively.

The full scan pulse load bus current waveform is presented in Appendix C1, and the TDS is presented in Appendix C2. The waveform is also stored on the AMSU-A2 Test Data File disc.

5.5.3 RESOLVER READING AND POSITION ERROR

Reflector positions are obtained by using the STE, which displays the resolver readings to be compared with the position commands. Two readings are taken, one at the start of integration (LOOK 1), and the other halfway into the integration period (LOOK 2). The limits on the difference between the reported position (actual) and the command are ±10 counts for LOOK 1 and ±5 counts for LOOK 2. A table of reflector position commands and the reported position obtained from the STE computer printout is shown in Table 2, together with the differences between actual and command.

BP	Command	Actual Look 1	Actual Look 2	Difference* Look 1	Difference* Look 2	BP	Command	Actual Look 1	Actual Look 2	Difference* Look 1	Difference* Look 2
1	8368	8369	8369	1	1	19	5638	5642	5639	4	1
2	8216	8218	8216	2	0	20	5486	5488	5486	2	0
3	8064	8068	8064	4	0	21	5334	5338	5334	4	0
4	7913	7918	7914	5	1	22	5183	5187	5183	4	0
5	7761	7762	7761	1	0	23	5031	5034	5031	3	0
6	7609	7613	7610	4	1	24	4879	4882	4879	3	0
7	7458	7462	7459	4	1	25	4728	4732	4728	4	0
8	7306	7309	7306	3	0	26	4576	4579	4576	3	0
9	7154	7157	7155	3	1	27	4424	4428	4425	4	1
10	7003	7008	7004	5	1	28	4273	4277	4274	4	1
11	6851	6855	6852	4	1	29	4121	4123	4121	2	0
12	6699	6703	6699	4	0	30	3969	3972	3970	3	1
13	6548	6552	6548	4	0	WC	14361	14362	14362	1	1
14	6396	6396	6396	0	0	CC1	2376	2377	2377	1	1
15	6244	6247	6244	3	0	CC2	2452	2451	2451	-1	-1
16	6093	6098	6093	5	0	CC3	2528	2529	2529	1	1
17	5941	5945	5941	4	0	CC4	2679	2680	2680	1	1
18	5789	5792	5789	3	0						

BP = Beam position   *Actual - Command

Table 2. Reflector (Beam) Position Commands and Measurements

5.5.4   GAIN AND PHASE MARGIN

The gain and phase margin test is performed on the position control loop of the antenna drive subsystem. Three separate open loop gain and phase plots (measured with the loop closed) are obtained. The DSA is used to make the plots using the swept sine mode. Gain margin is measured at the −180° phase crossover frequency, and phase margin is measured at the 0 dB gain crossover frequency. The margins on each of the three plots are above the minimum specification requirement of 12 dB and 25 degrees for the gain and phase respectively. The plots are presented in Appendices D1 through D6, and the TDS is presented in Appendix D7. The plots are also stored on the AMSU-A2 Test Data File disc.

5.5.5   OPERATIONAL GAIN MARGIN

The operational gain margin test is also done three times. This test consists of increasing the gain inside the rate loop until oscillation occurs. The gain increase is calculated and the frequency of oscillation is measured from the spectrum plot using the DSA. An increase in gain greater than 9 dB is required, and the frequency of oscillation is just recorded.

To increase the gain, a 50 kΩ pot is connected in series with the R58 feedback resistor on amplifier AR8 on the R/D Converter/Oscillator CCA. The resistance of the test pot is slowly added to the feedback resistor while observing the reflector for oscillations. The reflector begins to produce an audible sound as gain is increased to the point of oscillation. Table 3 shows the added resistance values and the calculated gain margin.

Resistance (kΩ)	Gain Margin (dB)
40.315	9.51
40.877	9.59
39.805	9.44

Table 3. Pot Resistance and Operational Gain Margin

The first mode mechanical resonance of the shaft and reflector is about 78 Hz as shown in the power spectrum. The spectrum was plotted and is presented in Appendix E1, and the TDS is presented in Appendix E2. The spectrum plot is also stored on the AMSU-A2 Test Data File disc.

6.0 CONCLUSION

Based on the test results, it can be concluded that the METSAT AMSU-A2 S/N 108 antenna drive subsystem meets the AMSU-A specification requirements.

7.0 TEST DATA

Test data for the CCAs and the antenna drive subsystem is presented in the appendices as outlined in the Appendix Index on the following page.

APPENDIX INDEX

TEST DATA SHEET B-6 (Sheet 1 of 2)

RESOLVER DATA ISOLATOR CCA (P/N 1334972) (Paragraph 6.6.7)

Date: 7/28/97

S/N: F33

1334972 -1

6.6.7.1 Supply Voltages

Supply*	Measured Value (V)	Limits (Vdc)	Pass/Fail
+5 V (I)	+5.00	± 0.25	P
+5 V (U)	+5.06	± 0.25	P

6.6.7.2 Supply Currents

Steps 1 and 2:

Supply*	Measured Value (mA)	Limits (mA)	Pass/Fail
+5 V (I)	53.47	100 max	P
+5 V (U)	324.10	400 max	P

Steps 3 and 4:

Supply*	Measured Value (mA)	Limits (mA)	Pass/Fail
+5 V (I)	82.91	150 max	P
+5 V (U)	11.94	30 max	P

* I = Isolated, U = Unisolated

6.6.7.3 Resolver Data

Bit No.	Pass/Fail
API 0 - AP Bit 0	P
API 1 - AP Bit 1	P
API 2 - AP Bit 2	P
API 3 - AP Bit 3	P
API 4 - AP Bit 4	P
API 5 - AP Bit 5	P
API 6 - AP Bit 6	P
API 7 - AP Bit 7	P
API 8 - AP Bit 8	P
API 9 - AP Bit 9	P
API 10 - AP Bit 10	P
API 11 - AP Bit 11	P
API 12 - AP Bit 12	P
API 13 - AP Bit 13	P

6.6.7.4 Converter Busy Pulse

Converter Busy Pulse	Measured Value (μsec)	Limits (μsec)	Pass/Fail
15.0	14.45	± 3.0	P

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TEST DATA SHEET B-6 (Sheet 2 of 2)

RESOLVER DATA ISOLATOR CCA (P/N 1334972) (Paragraph 6.6.7)

Comments: NONE

Conducted by: _____ 7/28/97
Test Engineer   Date

Verified by: _____ 07/29/97
Quality Control Inspector   Date

Approved by: _____ 7/29/97
DCMC   Date

TEST DATA SHEET B-13 (Sheet 1 of 3)

INTERFACE/CONVERTER CCA (P/N 1331697) (Paragraph 6.13.7)

Date: _8/6/97_

CCA S/N: _F25_

_1331697-1_

6.13.7.1 Supply Voltages

Supply	Measured Value (Vdc)	Limits (Vdc)	Pass/Fail
+5V (U)	5.00	+5V± 0.05	P
+15V (I)	15.00	+15V± 0.15	P
-15V (I)	−14.97	-15V± 0.15	P
+5V (I)	5.02	+5V± 0.05	P

6.13.7.2 Supply Currents

Step 1 (CP and API Low):

Supply	Measured Value (mA)	Limits (mA)	Pass/Fail
+5V (U)	86.70	70 - 110	P
+5V (I)	3.40	1.5 - 5.5	P
+15V (I)	17.96	15 - 23	P
-15V (I)	20.57	18 - 26	P

Step 2 (CP and API High):

Supply	Measured Value (mA)	Limits (mA)	Pass/Fail
+5V (U)	56.65	40 - 70	P
+5V (I)	23.96	18 - 30	P
+15V (I)	17.96	15 - 23	P
-15V (I)	20.57	18 - 26	P

6.13.7.3 Amplifier Offsets

Amplifier	Measured Value (mV)	Limits (mV)	Pass/Fail
AR1	+0.14	0.0 ±0.15	P
AR2	− 0.10	0.0 ±2.0	P

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TEST DATA SHEET B-13 (Sheet 2 of 3)

INTERFACE/CONVERTER CCA (P/N 1331697) (Paragraph 6.13.7)

6.13.7.4 Subtraction and D-A Conversion

umHummel 9-10-97   ± 0.00015
± 0.00060
± 0.00030

Step 1:

Actual Position (API) MSB LSB	Command Position (CP) MSB LSB	AR1 Output Voltage Required (Vdc)	Test Result (Vdc)	Pass/Fail
00000000000000	00000000000000	0.00000	+0.00014	P
00000000000001	00000000000000	-0.00061	-0.000433	P
00000000000010	00000000000000	-0.00122	-0.001056	P
00000000000011	00000000000000	-0.00184	-0.001688	P
00000000000100	00000000000000	-0.00245	-0.002310	P
00000000001000	00000000000000	-0.00490 *	-0.004797	P
00000000010000	00000000000000	-0.00979 *	-0.009764	P
00000000100000	00000000000000	-0.01958 *	-0.019700	P
00000001000000	00000000000000	-0.03917 *	-0.039572	P
00000010000000	00000000000000	-0.07834 *	-0.079323	P
00000100000000	00000000000000	-0.15667 *	-0.15882	P
00001000000000	00000000000000	-0.31334 *	-0.31785	P
00010000000000	00000000000000	-0.62669 *	-0.63590	P
00100000000000	00000000000000	-1.25338 *	-1.2723	P
01000000000000	00000000000000	-2.50675 *	-2.5447	P
10000000000000	00000000000000	-5.01350 *	-5.0899	P

* Tolerance on output voltage is ± 10%

umHummel 9-10-97   ± 0.00015
± 0.00060
± 0.00030

Step 2:

Actual Position (API) MSB LSB	Command Position (CP) MSB LSB	AR1 Output Voltage Required (Vdc)	Test Result (Vdc)	Pass/Fail
00000000000000	00000000000000	0.00000	+0.00014	P
00000000000000	00000000000001	0.00061	+0.000756	P
00000000000000	00000000000010	0.00122	+0.001390	P
00000000000000	00000000000011	0.00184	+0.002003	P
00000000000000	00000000000100	0.00245	+0.002628	P
00000000000000	00000000001000	0.00490 *	+0.005113	P
00000000000000	00000000010000	0.00979 *	+0.010100	P
00000000000000	00000000100000	0.01958 *	+0.020042	P
00000000000000	00000001000000	0.03917 *	+0.039926	P
00000000000000	00000010000000	0.07834 *	+0.079668	P
00000000000000	00000100000000	0.15667 *	+0.15924	P
00000000000000	00001000000000	0.31334 *	+0.31833	P
00000000000000	00010000000000	0.62669 *	+0.63653	P
00000000000000	00100000000000	1.25338 *	+1.2727	P
00000000000000	01000000000000	2.50675 *	+2.5452	P
00000000000000	10000000000000	-5.01350 *	-5.0899	P

* Tolerance on output voltage is ± 10%

TEST DATA SHEET B-13 (Sheet 3 of 3)

INTERFACE/CONVERTER CCA (P/N 1331697) (Paragraph 6.13.7)

6.13.7.5 <u>Strobe Function</u>

Step 1: <u>Strobe Low</u>

    No E11 Change
    with Input CP Changes

<u>Pass/Fail</u>

    P

Step 2: <u>Strobe High</u>

    E11 Change
    with Input CP Changes

<u>Pass/Fail</u>

    P

6.13.7.6 <u>Amplifier Gain</u>

	<u>Measured Value (Vdc)</u>	<u>Limits (Vdc)</u>	<u>Pass/Fail</u>
E11	0.31833	-	P
E10	3.4931	-	P
<u>E10 Voltage</u> E11 Voltage	10.97	10.7 - 11.3	P

6.13.7.7 <u>Ground Isolation</u>

	<u>Measured Value (MΩ)</u>	<u>Limits (MΩ)</u>	<u>Pass/Fail</u>
Pin 91 to Pin 7 DC Resistance	larger than 115 MΩ	>20	P

Comments:
   NONE

Conducted by:	_Denise Lu_	_8/6/97_
	Test Engineer	Date
Verified by:	_Richard Stutt_ (7A 190)	_10/10/97_
	Quality Control Inspector	Date
Approved by:	_Richard Thomas_	_10/14/97_
	DCMC	Date

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TEST DATA SHEET B-4 (Sheet 1 of 2)

MOTOR DRIVER 3-HALL SENSOR CCA (P/N 1331694) (Paragraph 6.4.3)

S/N: F02
Date: 4/17/97
1331694-4

6.4.3.2 Input Signal Offset

Step No.	Test Results	Limits
4	1.21 mV	0.0 ±1 mVdc
6	1.41 mV	0.0 ±1 mVdc
8	0.93 mV	0.0 ±1 mVdc

Step No.	Test Resistor	Resistance Measured
13	E7-E8 (R25)	3.16K
	E9-E10 (R52)	4.80k
	E11-E12 (R33)	3.40k
	E13-E14 (R53)	5.80k
	E15-E16 (R42)	3.16k
	E17-E18 (R54)	4.30k

Step No.	Resistors	Selected Trim Resistors
14	R25	RNC55J3161FS
	R52	RNC55J4751FS
	R33	RNC55J3401FS
	R53	RNC55J5621FS
	R42	RNC55J3161FS
	R54	RNC55J4221FS

Step No.	E Point	Test Results	Limits	Pass/Fail
19	E19	−0.01 mV	0.0 ±1 mVdc	P
	E20	0.02 mV	0.0 ±1 mVdc	P
	E21	0.04 mV	0.0 ±1 mVdc	P

6.4.3.3 Motor Driver Operation

Clockwise Rotation:

Step No.	Test Results	Limits	Pass/Fail
2	5.00 V	+5V±0.05Vdc	P
	52.6 mA	70mAdc max	P
	15.07V	+15V±0.15Vdc	P
	1.5 mA	3.0mAdc max	P
	−14.98V	-15V±0.15Vdc	P
	18.5 mA	25mAdc max	P
	28.03V	+28V±0.5Vdc	P
	5.6 mA	8mAdc max	P
3	275 mV	400mVdc max	P
4	42.2 mA	50mAdc max	P
5	47.2 mA	50mAdc max	?

TEST DATA SHEET B-4 (Sheet 2 of 2)

MOTOR DRIVER 3-HALL SENSOR CCA (P/N 1331694) (Paragraph 6.4.3)

Counter Clockwise Rotation:

Step No.	Test Results	Limits	Pass/Fail
3	280 mV	400mVdc max	P
4	36.6mA	50mAdc max	P
5	40.0 mA	50mAdc max	P

6.4.3.4 Current Limit Test

Step No.	Test Results	Limits	Pass/Fail
2	460 mA	350-500mAdc	P

Comments: NONE

Conducted by: _Dennis Lu_ 4/17/97
Test Engineer   Date

Verified by: _Sudep Herrey (369)_ 04/28/97
Quality Control Inspector   Date

Approved by: _____ 4/29/97
DCMC   Date

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TEST DATA SHEET B-4 (Sheet 1 of 2)

MOTOR DRIVER 3-HALL SENSOR CCA (P/N 1331694) (Paragraph 6.4.3)

S/N: _F∅3_
Date: _4/17/97_
_1331694-4_

6.4.3.2 Input Signal Offset

Step No.	Test Results	Limits
4	1.49 nV	0.0 ±1 mVdc
6	1.00 nV	0.0 ±1 mVdc
8	1.45 mV	0.0 ±1 mVdc

Step No.	Test Resistor	Resistance Measured
13	E7-E8 (R25)	2.80k
	E9-E10 (R52)	4.50k
	E11-E12 (R33)	2.80k
	E13-E14 (R53)	3.80k
	E15-E16 (R42)	2.10k
	E17-E18 (R54)	4.35k

Step No.	Resistors	Selected Trim Resistors
14	R25	RNC55J2801FS
	R52	RNC55J4531FS
	R33	RNC55J2801FS
	R53	RNC55J3741FS
	R42	RNC55J2801FS
	R54	RNC55J4221FS

Step No.	E Point	Test Results	Limits	Pass/Fail
19	E19	− 0.05mV	0.0 ±1 mVdc	P
	E20	+ 0.05mV	0.0 ±1 mVdc	P
	E21	+ 0.06 mV	0.0 ±1 mVdc	P

6.4.3.3 Motor Driver Operation

Clockwise Rotation:

Step No.	Test Results	Limits	Pass/Fail
2	+5.00V	+5V±0.05Vdc	P
	52.4 mA	70mAdc max	P
	+15.07 V	+15V±0.15Vdc	P
	1.6 mA	3.0mAdc max	P
	−15.00 V	-15V±0.15Vdc	P
	18 mA	25mAdc max	P
	+28.04 V	+28V±0.5Vdc	P
	6 mA	8mAdc max	P
3	+277 mV	400mVdc max	P
4	42.1 mA	50mAdc max	P
5	47.5 mA	50mAdc max	P

_A3_

TEST DATA SHEET B-4 (Sheet 2 of 2)

MOTOR DRIVER 3-HALL SENSOR CCA (P/N 1331694) (Paragraph 6.4.3)

Counter Clockwise Rotation:

Step No.	Test Results	Limits	Pass/Fail
3	300 mV	400mVdc max	P
4	37.2 mA	50mAdc max	P
5	38.8 mA	50mAdc max	P

6.4.3.4 Current Limit Test

Step No.	Test Results	Limits	Pass/Fail
2	450 mA	350-500mAdc	P

Comments: NONG

Conducted by: _____ (7A 269) 4/17/97
Test Engineer   Date

Verified by: _____ 04/28/97
Quality Control Inspector   Date

Approved by: _____ 4/29/97
DCMC   Date

A3

TEST DATA SHEET B-5 (Sheet 1 of 3)

R-D CONVERTER/OSCILLATOR CCA (P/N 1337739) (Paragraph 6.5.7)

Date_____ 3/26/97
CCA S/N_____ F11
_____ 1337739-2

6.5.7.1   UUT Pre-Test

Step 2:

Supply Currents (Without UUT)

Supply (Vdc)	(Baseline) Measured Value (mA) (Without UUT)	Limits (mA)	Pass/Fail
+15	0.06	0-1	P
-15	-0.28	-1 - 0	P
+5	0.06	0-1	P

Supply Voltages (Without UUT)

Supply	Measured Value (V)	Limits (V)	Pass/Fail
+15V (I)	15.02	± 0.50	P
-15V (I)	-15.02	± 0.50	P
+5V (I)	5.03	±0.25	P

Step 6:

Supply Currents (UUT Installed)

Supply (Vdc)	Measured Value (mA) (UUT Installed)	Difference (mA) (Measured - Baseline)	Limits (mA)	Pass/Fail
+15	32.20	32.14	20-40	P
-15	-37.84	-37.56	-30 - -50	P
+5	56.76	56.70	30-70	P

6.5.7.2   Supply Voltages (UUT Installed)

Supply	Measured Value (V)	Limits (V)	Pass/Fail
+15V (I)	15.01	± 0.50	P
-15V (I)	-14.97	± 0.50	P
+5V (I)	5.02	±0.25	P

6.5.7.3   Oscillator Frequency, Duty Cycle, and Output Voltage

Parameter	Measured Value	Limits	Pass/Fail
Frequency	1610 Hz	1550-1650 Hz	P
Duty Cycle	51.7 %	45-55 %	P
Output Voltage	8.03 V	7.6-8.4 Vrms	P

A4

TEST DATA SHEET B-5 (Sheet 2 of 3)

R-D CONVERTER/OSCILLATOR CCA (P/N 1337739) (Paragraph 6.5.7)

6.5.7.4   R-D Converter Operation

Step 1:

Bit Number/ Test Fixture Label	CW Pass/Fail	CCW Pass/Fail
API 0/1	P	P
API 1/2	P	P
API 2/3	P	P
API 3/4	P	P
API 4/5	P	P
API 5/6	P	P
API 6/7	P	P
API 7/8	P	P
API 8/9	P	P
API 9/10	P	P
API 10/11	P	P
API 11/12	P	P
API 12/13	P	P
API 13/14	P	P
Converter Busy	P	P

Step 2:

RS (E10)	Measured Value (Vdc)	Calculated Value (Vdc) * CCA -1 Assy	Calculated Value (Vdc) * CCA -2 Assy	Pass/Fail
CW Rotation**	1.557	(+) N/A	(+) 1.790	P
CCW Rotation**	− 1.846	(−) N/A	(−) 1.790	P

* Signal level function of test and calibration gain resistors. Record calculated value and measured value. Measured value shall be within ±10 percent of calculated value. The equation is as follows:

$$V = \pm 0.155\left(\frac{R20}{R17}\right) \pm 10\% \qquad = 0.155\left(\frac{59k}{5.11k}\right)$$

$$= 1.790 V$$

6.5.7.5   Amplifier Gain

PES-RS	Measured Value (Vdc)	Limits (Vdc)	Pass/Fail
PES = +0.300 Vdc	1.168	1.00 to 1.30	P
PES = -0.300 Vdc	1.064	1.00 to 1.30	P

6.5.7.6   Direction Control Signal

DIR CNTRL	Measured Value (Vdc)	Limits (Vdc)	Pass/Fail
CW Rotation	5.000 V	4.5 to 5.5	P
CCW Rotation	0.132 V	0.0 to 0.4	P

A4

TEST DATA SHEET B-5 (Sheet 3 of 3)

R-D CONVERTER/OSCILLATOR CCA (P/N 1337739) (Paragraph 6.5.7)

6.5.7.7   Notch Filter Frequency Response

Frequency	Measured Value (Hz)	Calculated Value (Hz) * CCA -1 Assy	Calculated Value (Hz) * CCA -2 Assy	Pass/Fail
AR3 Notch	N/A	N/A	N/A	N/A
AR4 Notch	↓	↓	↓	↓
AR5 Notch	↓	↓	↓	↓

* Notch frequencies shall be within ±3 percent of values determined by test and calibration resistors. Record calculated and measured values.

Comments: NONE

Conducted by: _Dennis Lum_   8/26/97
Test Engineer   Date

Verified by: _____   NOV 19 '97
Quality Control Inspector   Date

Approved by: _____   11-14-97
DCMC   Date

CAP TIM BUF
36.0

4.5
/Div

Real

V

Fxd Y 0.0

0.0

__Jitter and Overshoot Limits__

Position 30 Volts - Position 1 Volts = 10.45 Volts

Volts per degree = $\dfrac{10.45\ Volts}{96,658°}$ = 0.1081 V/degree

1% antenna motion = 0.1081 V/degree × 0.03333 = 3.603 mV/1%

±5% Jitter limits = 3.603 mV/1% × ±5% = ±18.02 mV

or 36.04 mV pk-pk

4% Overshoot = 3.603 mV/1% × 4% = 14.41 mV

8.0

Sec
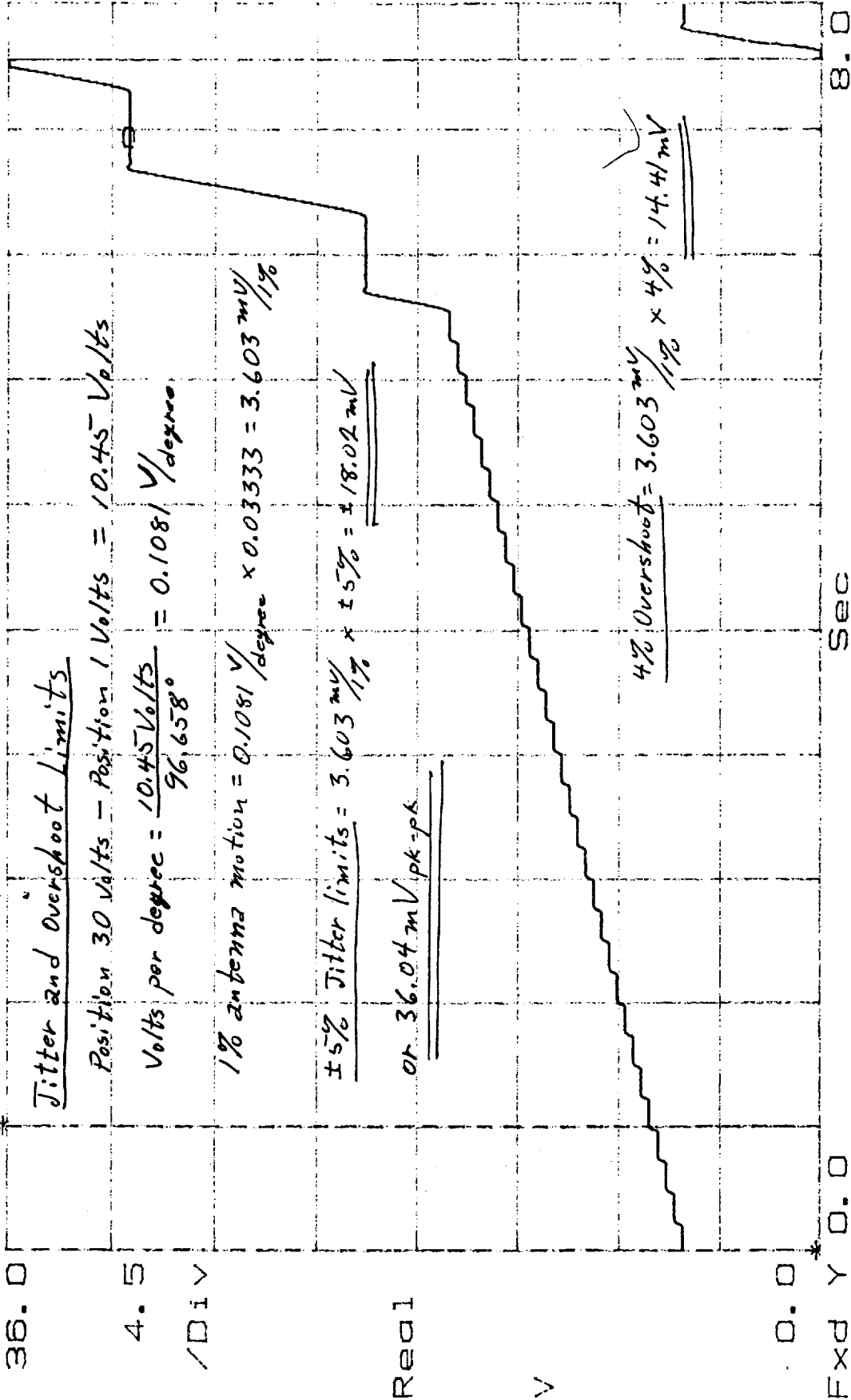
Preliminary Antenna Position Full Scan

Test Engr: _____ Date: 4/13/69

File: 6AP-1-FSP

P 3.4.5.1

Quality: _____ 7A 266

B1

X=163.7mS ΔX=39.06mS Y=6.54016 ΔY=4.98mV
Ya=6.1823g ΔYa=351.9mV
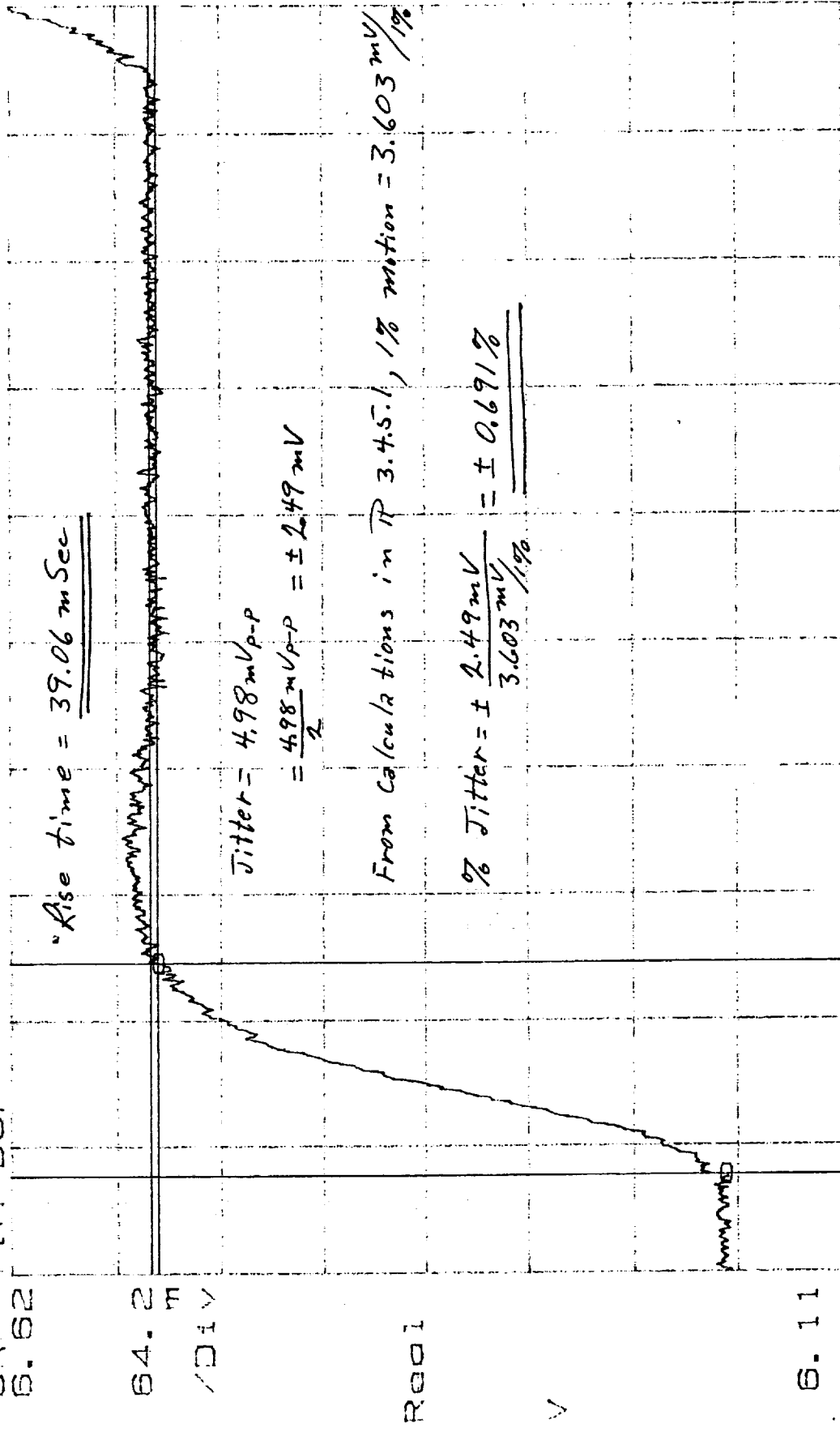
CAP TIM BUF
5.62

64.2 m
/Div

"Rise time = 39.06 mSec"

$Jitter = 4.98 mV_{p-p}$

$= \dfrac{4.98 mV_{p-p}}{2} = \pm 2.49 mV$

From Calculations in TP 3.4.5.1, 1% motion = 3.603 mV/1%

$\% Jitter = \pm \dfrac{2.49mV}{3.603 mV/1\%} = \pm 0.691\%$

Radi

V

6.11 146m Sec

FxdXY 146m

377m

7AP_FSS

Scan Motion and Jitter   Test Engr: _____ Date: 4/28/84

TP 3.4.5.5
Step 1-2
Quality: _____

S/O: 335/168
P/N: 133/200-2-IT
S/N: 108

B2

Y=6.5386   ΔY=18.05mV

CAP TIM BUF
5.62

Y=6.5386

+5% limit

Overshoot = 0.0mV

64.2 m
/Div

Real

V

6.11

FxdXY 146m   Sec   7AP_FSS   377m

Scan Motion and Jitter
π 3,4,5,5
Step 1-2

Test Engr: _____ Date: 4/26/95
Quality: _____ ⑦A 268

B3

X=403.9mS ΔX=39.06mS Y=6.90096 ΔY=7.385mV
Ya=6.89924 ΔYa=360.0mV
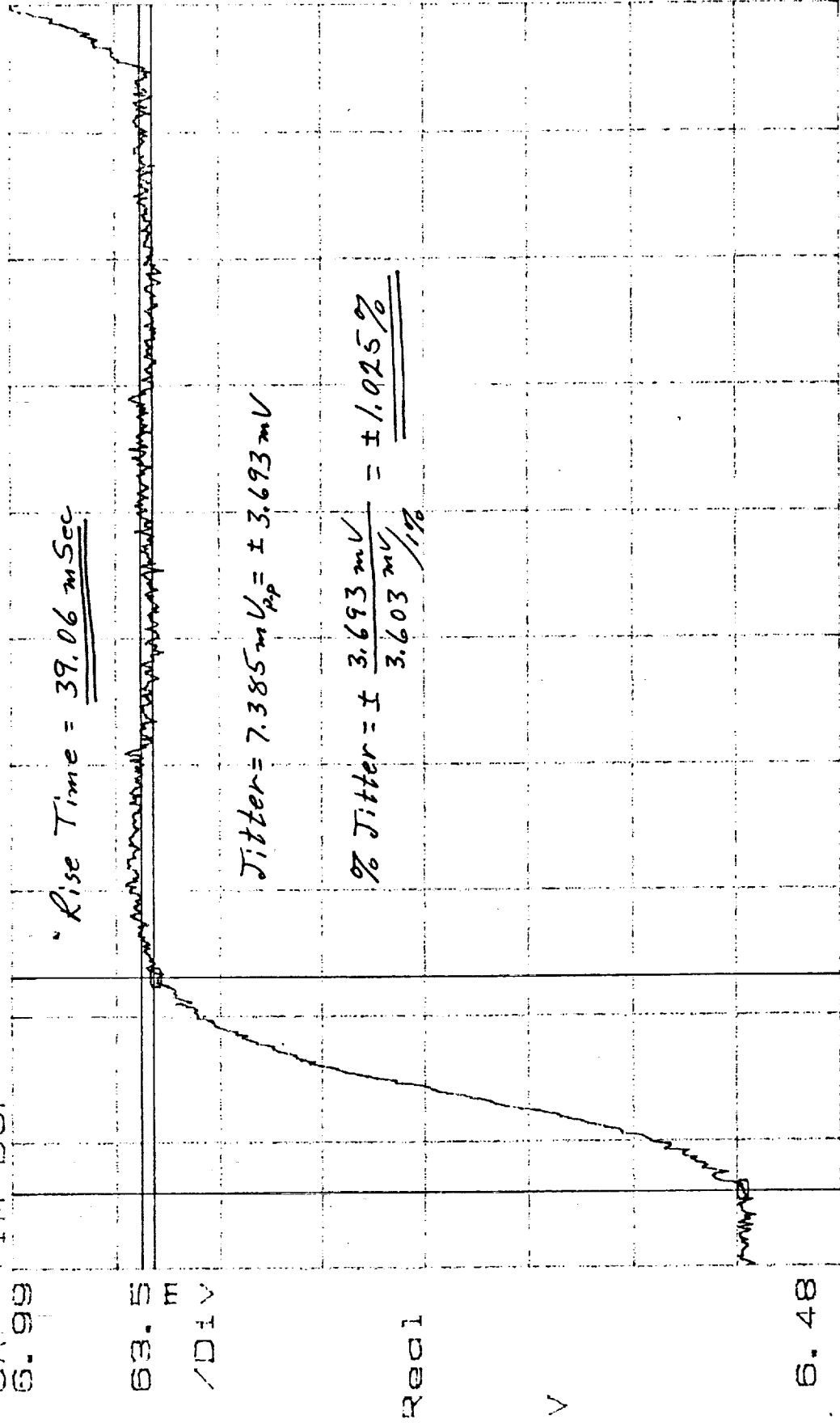
CAP TIM BUF
6.99

63.5 m
/Div

Real

V

6.48

FxdXY 351m   Sec   579m

7AP_FSS

"Rise Time = 39.06 mSec

Jitter = 7.385 mV_pp = ± 3.693 mV

% Jitter = ± $\frac{3.693 \, mV}{3.603 \, mV}$ /1% = ± 1.025 %

S/O: 335/68
P/N: 1331200-2-IT
S/N: 108

Scan Motion and Jitter   Test Engr: _____ Date: 4/20/99
π 3.4.5.5   Quality: _____ (TA 268)
Step 2-3

B4

Y=6.90311   ΔY=18.16mV

CAP TIM BUF
6.99

63.5 F
/Div

Real

6.48

FxdXY 351m   Sec   7AP_FSS   579m

+5% limit

Overshoot = 0.0mV

Scan Motion and Jitter   Test Engr _____   Date: 4/20/69
π 3.4.5.5
step 2-3   Quality: _____

S/O: 335/68
P/N: 133/200-2-IT
S/N: 108

B5

X=568.7mS   Y=7.26147   ΔY=6.289mV
Ya=6.9105g   ΔX=41.8mS
             ΔYa=350.3mV

CAP TIM BUF
7.34
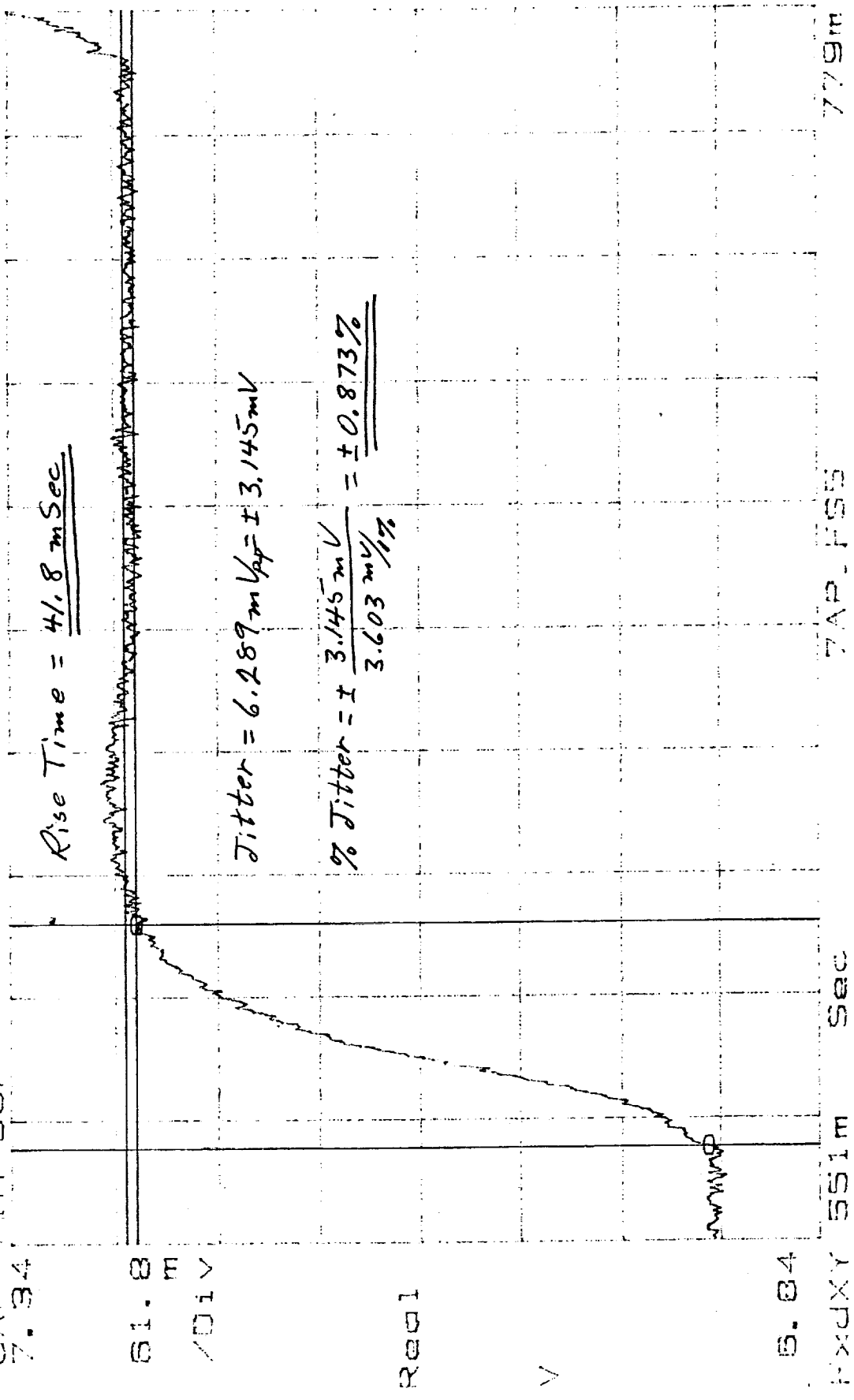
61.8 m
/Div

Real

V

5.84

FxdXY 551m   Sec

7AP_FS5
779m

Rise Time = 41.8 mSec

$Jitter = 6.289\ mV_{pp} = \pm 3.145\ mV$

$\%\ Jitter = \pm \dfrac{3.145\ mV}{3.603\ mV/\%} = \pm 0.873\%$

S/O: 335/68
P/N: 131200-2-IT
S/N: 108

Scan Motion and Jitter   Test Engr: _[signature]_   Date: 4/24/97
π 3.4.5.5
Step 3-4   Quality: _[stamp]_

B6

Y=7.26417   ΔY=17.97mV

CAP TIM BUF
7.34

61.8
m
/Div

Real

V

6.84

FxdXY 551m   Sec   7AP FSS   779m

+5% limit

Overshoot = 0.0 mV

Scan Motion and Jitter   Engr: [signature]

IT 3,4,5,5
Step 3-4

SO: 335168
P/N: 133/200-2-IT
S/N: 108

(7A 268)

Quality:

Date: 4/20/64

B7

X=806.2mS   ΔX=38.28mS   Y=7.65056   ΔY=11.92mV
Ya=7.64852   ΔYa=382.8mV

CAP TIM BUF
7.73
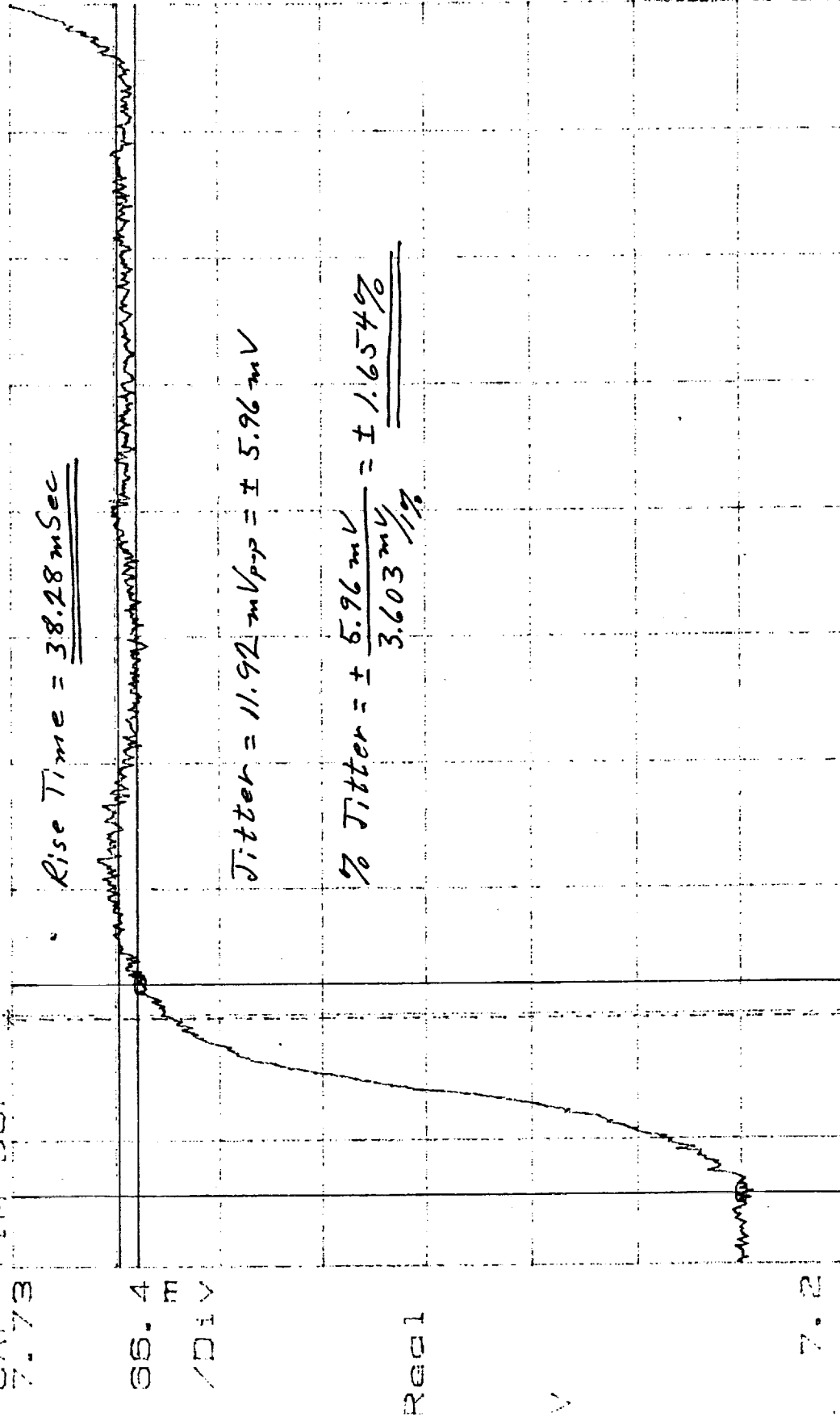
65.4
m
/Div

Real

V

7.2

FxdXY 755m   Sec   7AP FSS   983m

Rise Time = 38.28 mSec

$Jitter = 11.92 \, mV_{P-P} = \pm 5.96 \, mV$

$\% \, Jitter = \pm \dfrac{5.96 \, mV}{3.603 \, mV/\%} = \pm 1.654 \%$

Scan Motion and Jitter   Test Engr: [signature]   Date: 4/20/89
¶ 3.4.5.5   Quality: [signature] ⓥ(268)
Step 4-5

S/O: 335168
P/N: 133/800-2-IT
S/N: 108

B8

Y=7.657   ΔY=18.03mV

CAP TIM BUF
7.73

66.4 m
/Div

+5% limit

Overshoot = 0.0mV

Real

V

7.2

FxdXY 755m   Sec   7AP_FS5   983m

Scan Motion and Jitter
3.4.5.5
Step 4-5

Test Engr: _____   Date: 4/24/07
Quality: _____
(892 / AL)

89

X=1.013S   ΔX=41.02mS   Y=8.01808   ΔY=10.7mV
Ya=8.01505   ΔYa=355.2mV

CAP TIM BUF
8.1
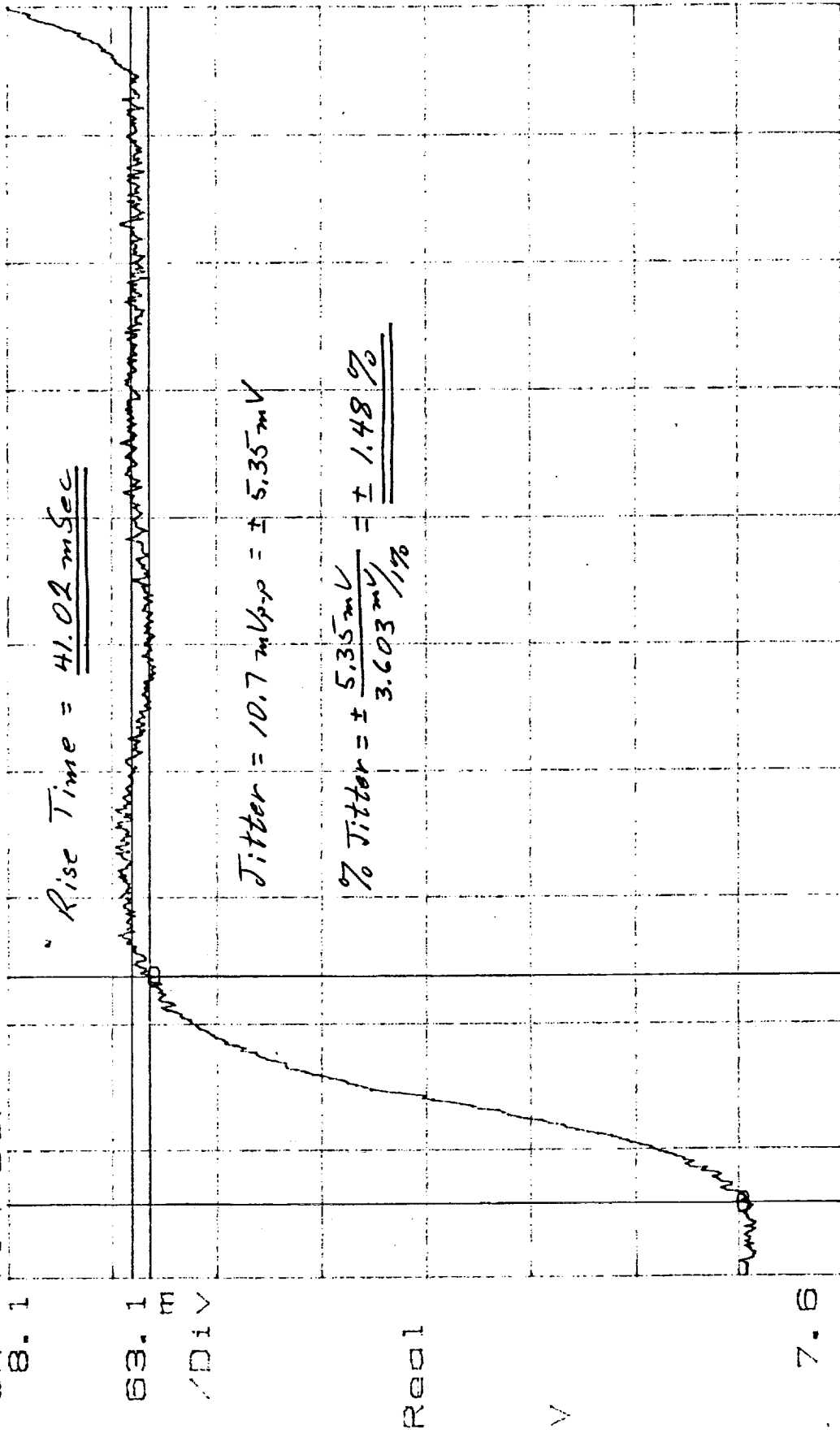
63.1
m
/Div

Real

V

7.6

FxdXY 959m   Sec   CAP_FSS   1.19

"Rise Time = 41.02 mSec

Jitter = 10.7 mVp-p = ± 5.35 mV

% Jitter = ± $\frac{5.35 mV}{3.603 mV/\%}$ = ± 1.48 %

s/o: 335/68
P/N: 1331200-2-IT
s/n: 108

Scan Motion and Jitter   Test Engr:_____ Date: 4/9/96
TP 3.4.5.5-   Quality:_____
Step 5-6

B10

CAP TIM BUF

Y=8.0232S   ΔY=18.04mV

8.1

63.1
m
/Div

Rael

V

7.6

FxJXY 959m   Sec   7AP-FSS   1.19

+5% limit

Overshoot = 0.0mV
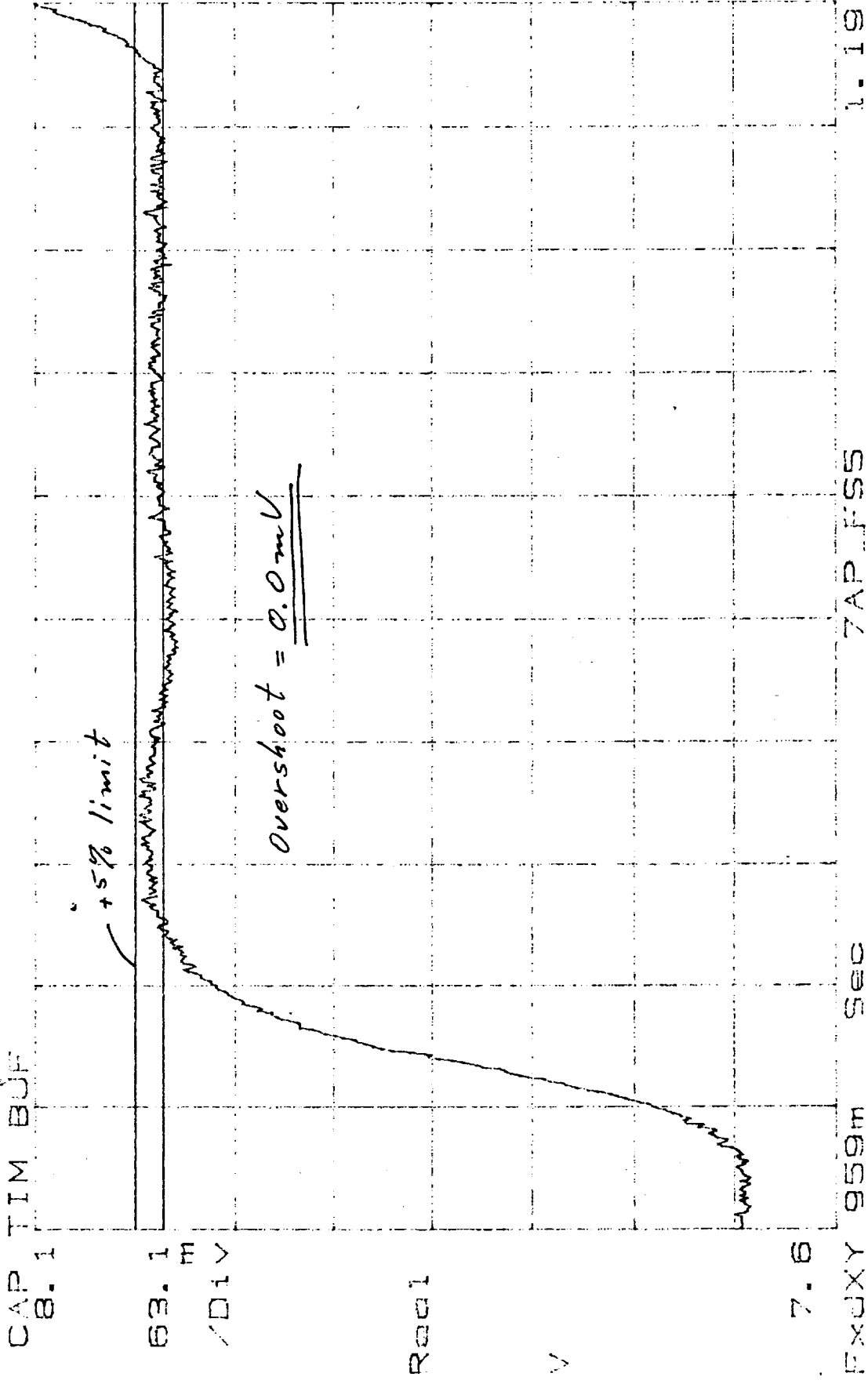
Scan Motion and Jitter   Test Engr: _____ Date: 4/20/65
π 3.4.5.5   Quality: _____
Step 5-6

B11

X=1.212S ΔX=37.5mS Y=8.35828 ΔY=15.05mV
Ya=8.35726 ΔYa=330.9mV
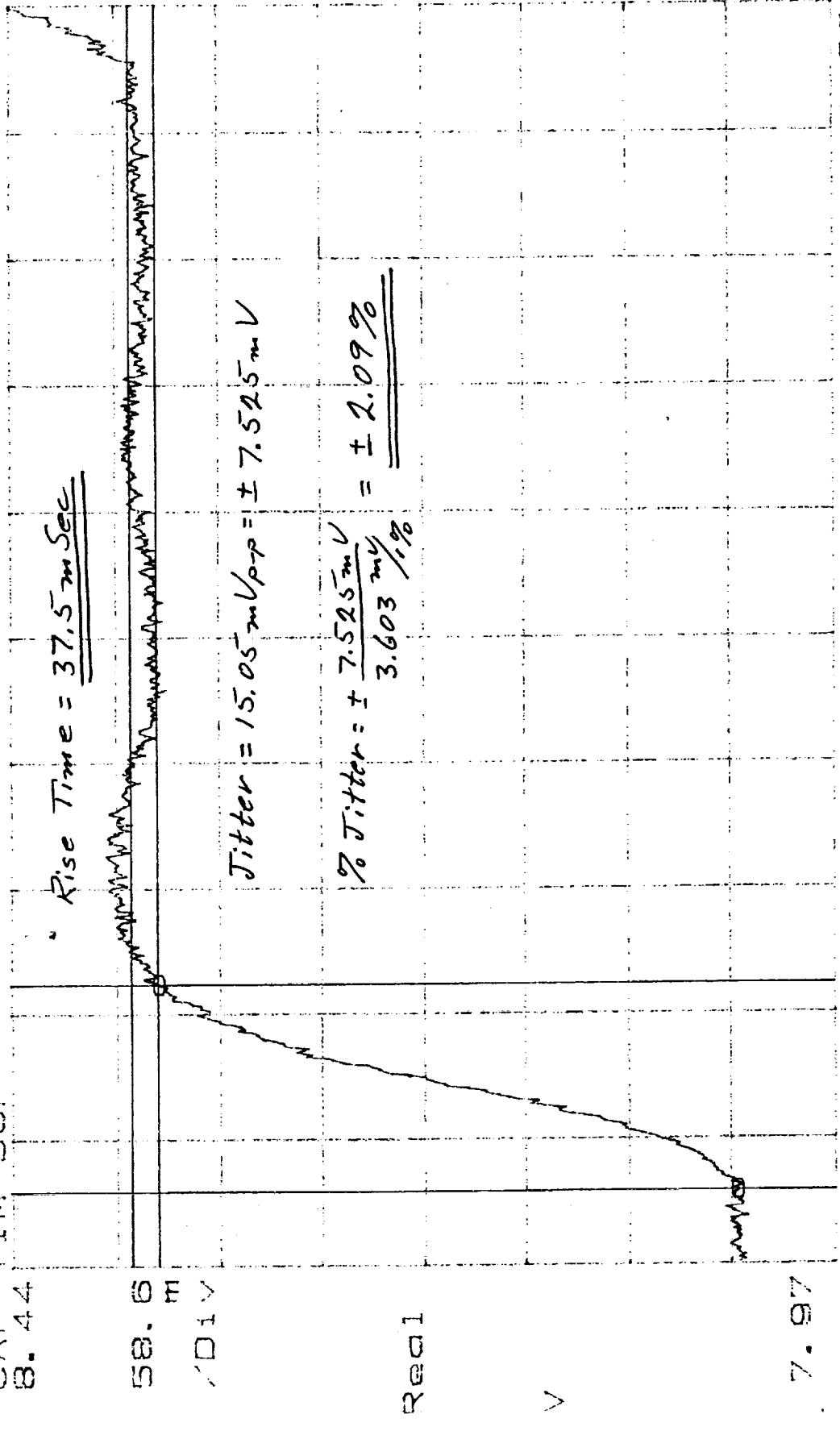
CAP TIM BUF
8.44

58.6
m
/Div

Real

V

7.97   FxdXY 1.16   Sec   7AP_PSS   1.39

* Rise Time = 37.5mSec

Jitter = 15.05mVp-p = ± 7.525mV

% Jitter = ± 7.525mV / 3.603 mV/1% = ± 2.09%

Scan Motion and Jitter
IT 3.4.5.5
step 6-7

S/O: 3357468
P/N: 133/200-2-IT
S/N: 108

Test Engr: [signature] Date: 4/20/97
Quality! (260)

B12

CAP TIM BUF   Y=8.3668   ΔY=18.18mV
3.44

58.6
m
/Div

Real

V

7.97   FxdXY 1.16   Sec   7APJF55   1.39

+5% limit

Overshoot = .0.0mV

Scan Motion and Jitter
P 3.4.5.5
Step 6-7

S/O: 335168
P/N: 133/200-2-IT
S/N: 108

Test Engr: [signature]   Date: 4/20/99
Quality: (B92) WL

B13

X=1.377 S   ΔX=39.06mS   Y=8.72013   ΔY=7.271mV
Ya=8.37185   ΔYa=347.1mV

CAP TIM BUF
8.8
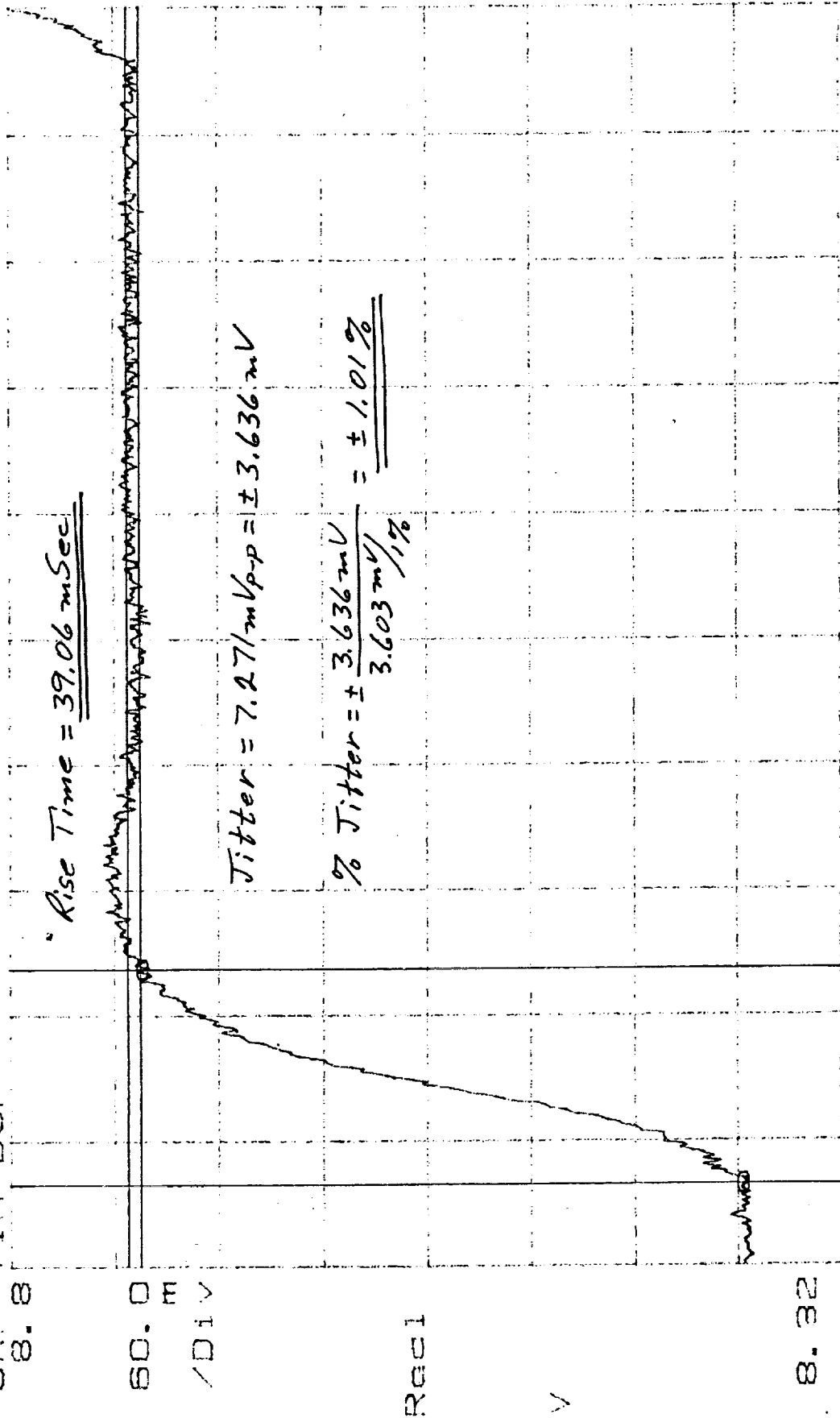
60.0 mE
/Div

Racl

V

8.32

FxdXY 1.36   Sec   7AP_FSS   1.59

"Rise Time = 39.06 mSec"

$Jitter = 7.271\, mV_{p-p} = \pm 3.636\, mV$

$\%\ Jitter = \pm \dfrac{3.636\, mV}{3.603\, mV/1\%} = \pm 1.01\%$

Scan Motion and Jitter
TP 3.4.5.5
step 7-8

Y=8.7242   ΔY=18.03mV

CAP TIM BUF
8.8
80.0 m /Div
Real
V
8.32
FxdXY 1.36   Sec   7AP_F55   1.59

+5% limit

Overshoot = 0.0mV

X=1.58 S   Y=9.07566   ΔY=10.44mV
Ya=8.72217   ΔX=39.06mS
ΔYa=351.9mV

CAP TIM BUF
9.15

59.8 m
/Div

Real

V

8.67
FxdXY 1.57   Sec

"Rise Time = 39.06 mSec

$Jitter = 10.44\,mVp\text{-}p = \pm 5.22\,V$

$\%\,Jitter = \pm \dfrac{5.22\,mV}{3.603\,mV/1\%} = \pm 1.45\%$
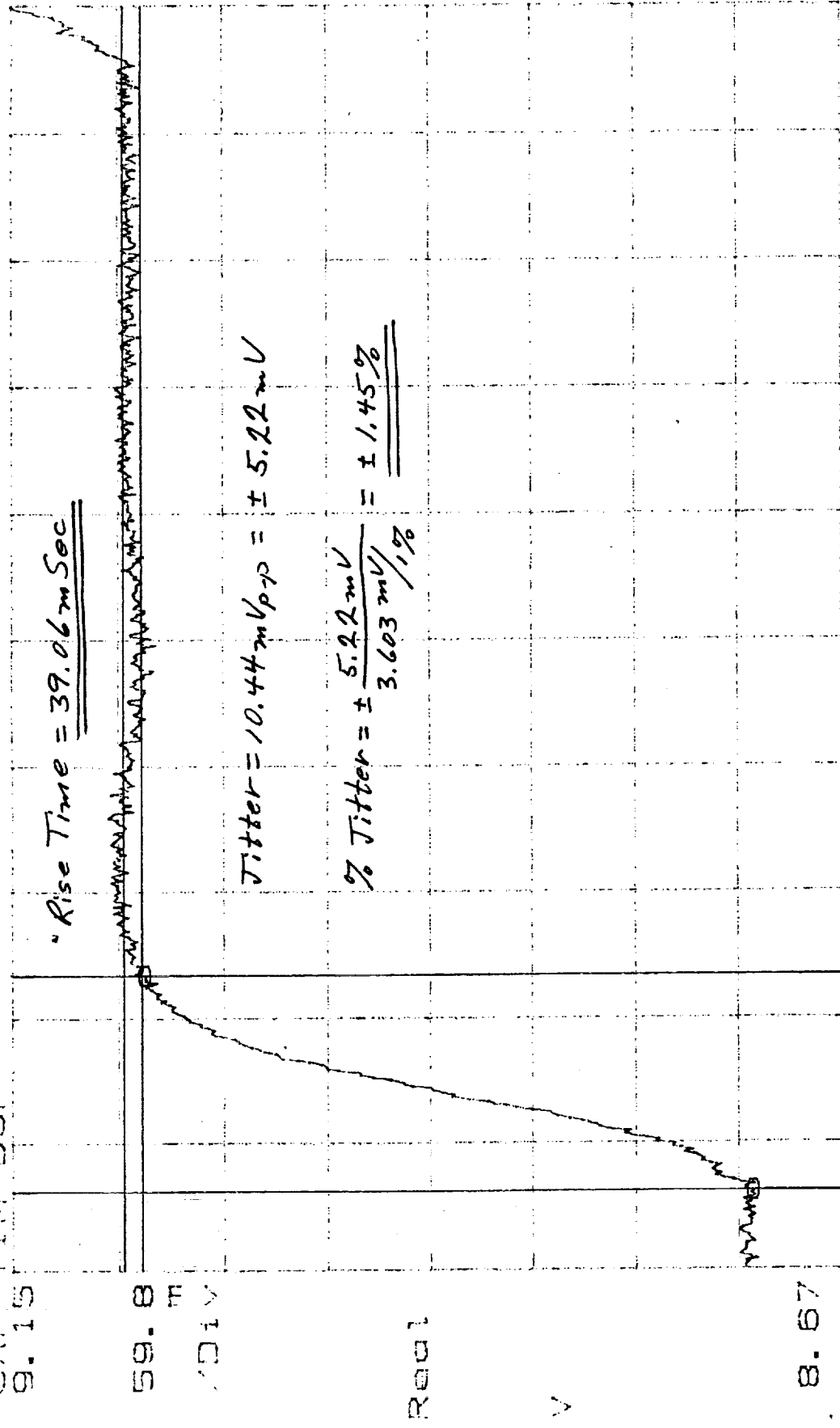
Scan Motion and Jitter
T 3.7.5.5
Step 8-9

YAP-SS   1.79

S/O: 335-168
P/N: 133/200-2-IT
S/N: 108

Test Engr: [signature]   Date: 4/20/??
Quality: 7A 868

B16

Y=9.0803   ΔY=17.97mV

CAP TIM BUF
9.15

+5% limit

Overshoot = 0.0mV

59.8 F

/Div

Real

8.67

FxdXY 1.57   Sec   7AP_FSS   1.79

Scan Motion and Jitter
17 3.4.5.5
Step 8-9

Test Engr: [signature]   Date: 4/20/69
Quality: 7A
                         268

S/O: 335168
P/N: 1331200-2-1T
S/N: 108

B17

X=1.823S   ΔX=40.23mS   Y=9.4375   ΔY=11.6mV
Ya=9.4373g   ΔYa=351.9mV
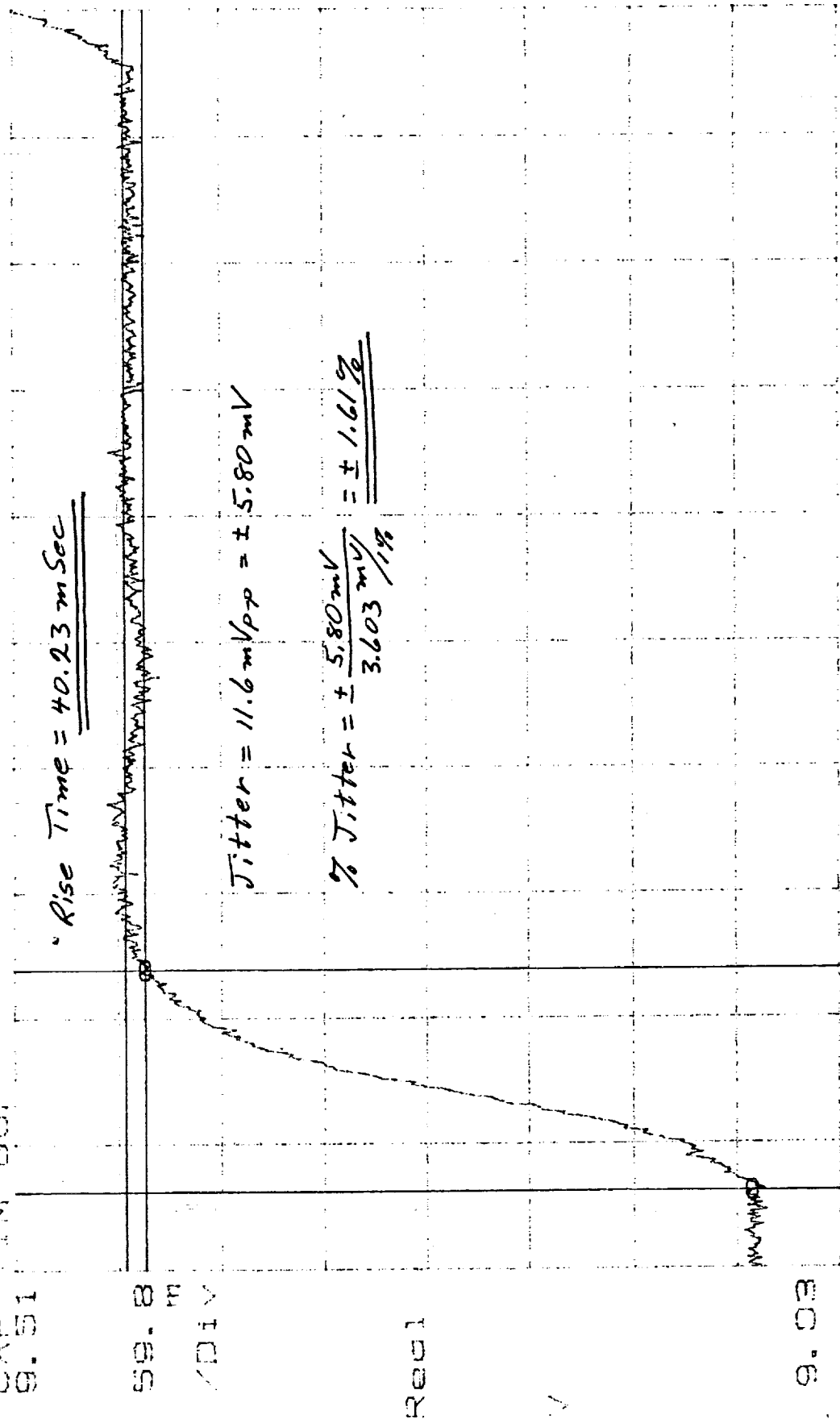
CAP TEM BU:
9.51

59.8 m
/Div

Recl

FXJNY 1.77   Sec

9.03

"Rise Time = 40.23 mSec"

Jitter = 11.6mV/p-p = ± 5.80 mV

% Jitter = ± $\frac{5.80mV}{3.603 mV/\%}$ = ± 1.61 %

2.0

7APJ55

Scan Motion and Jitter
π 3.4.5.5
Step 9-10

Test Engr: LS _____   Date: 4/24/98
Quality: _____   (7A) (268)

s/o: 335/168
P/N: 1331400-2-IT
s/N: 108

B18

Y=9.44388   ΔY=17.98mV

CAP TIM BUF
9.51

59.8 m /Div

Real

V

9.03

FxdXY 1.77   Sec   7APR:55   2.0

+5% limit

Overshoot = 0.0mV

Scan Motion and Jitter
P 3.4.5.5
Step 9-10

S/O: 335/68
P/N: 133/200-2-IT
S/N: 108

Test Engr: _____ Date: 4/2?/67
Quality: _____
TA 268

B19

X=1.984 S   ΔX=41.8mS   Y=9.79922   ΔY=12.54mV
Ya=9.4455   ΔYa=355.2mV

CAP TIM BUF
9.87
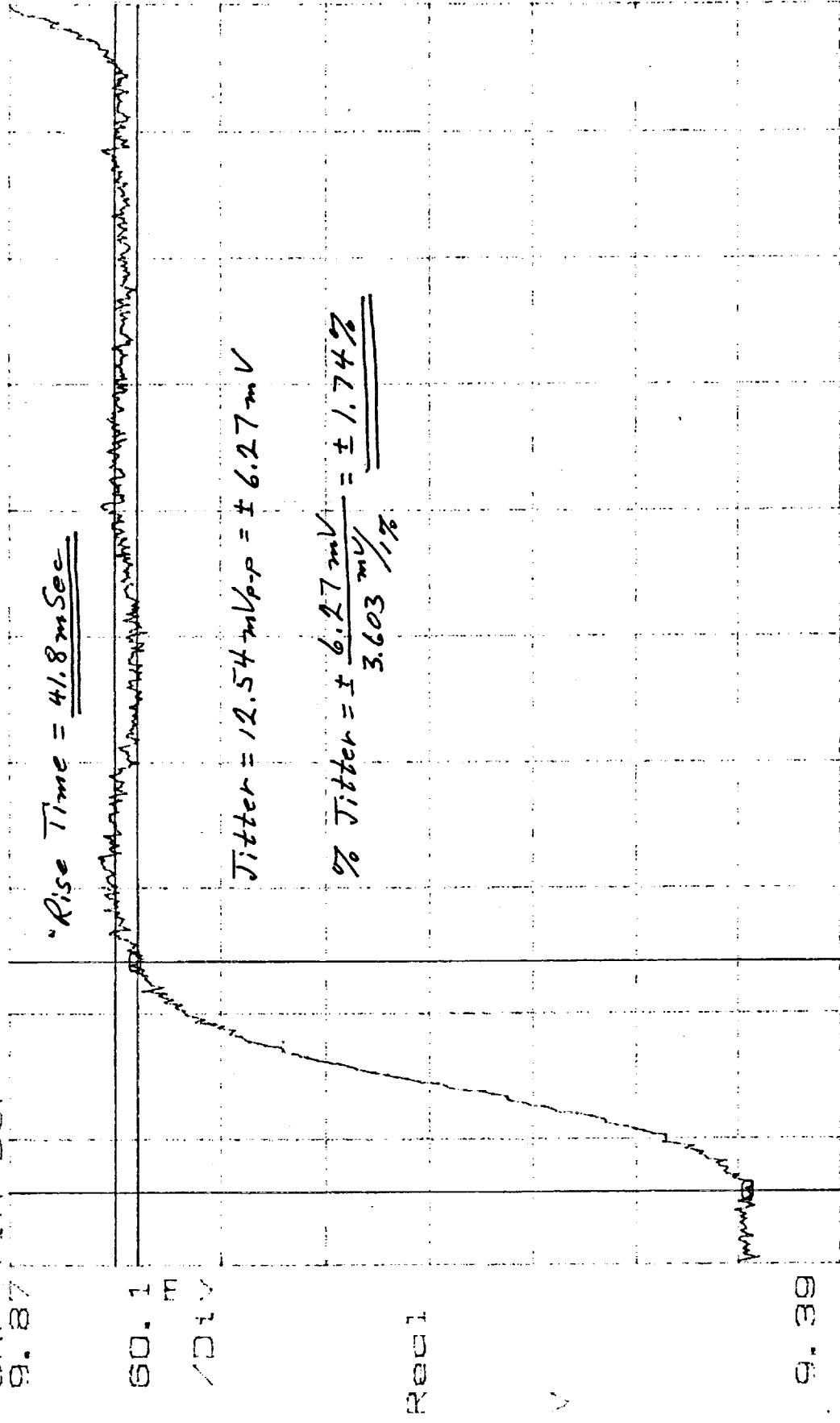
60.1 m
/Div

Real

9.39

Fx:XY 1.97   Sec   7AP_FSS   2.2

"Rise Time = 41.8 mSec

$Jitter = 12.54\,mV_{p-p} = \pm 6.27\,mV$

$\% Jitter = \pm \dfrac{6.27\,mV}{3.603\,mV/1\%} = \pm 1.74\%$

Scan Motion and Jitter
TP 3.4.5.5
Step 10-11

S/O: 335168
P/N: 1331200-2-IT
S/N: 108

Test Engr: David   Date: 4/20/99
Quality:

B20

Y=9.80622   ΔY=18.07mV

CAP TIM BUF
9.87

60.1 F /Div

Real

V

9.39

FxPXY 1.97   Sec   7AP_FSS   2.2

+5% limit

Overshoot = 0.0mV

Scan Motion and Jitter   Test Engr: _____ Date: 4/26/97
                                              Quality: _____
IT 3.4.5.5
Step 10-11

S/O: 335168
P/N: 1331200-2-IT
S/N: 108

B21

X=2.229 S   ΔX=41.41mS   Y=10.1421   ΔY=9.911mV
Ya=10.1413   ΔYa=330.9mV

CAP TIM BUF
10.2

60.1 m /Div

Rccl

V

9.75

FxdXY 2.17   Sec

"Rise Time = 41.41 mSec

$Jitter = 9.911 \; mV_{PP} = \pm 4.956 \; mV$

$\%\, Jitter = \pm \dfrac{4.956 \; mV}{3.603 \; mV/\%} = \pm 1.38\%$
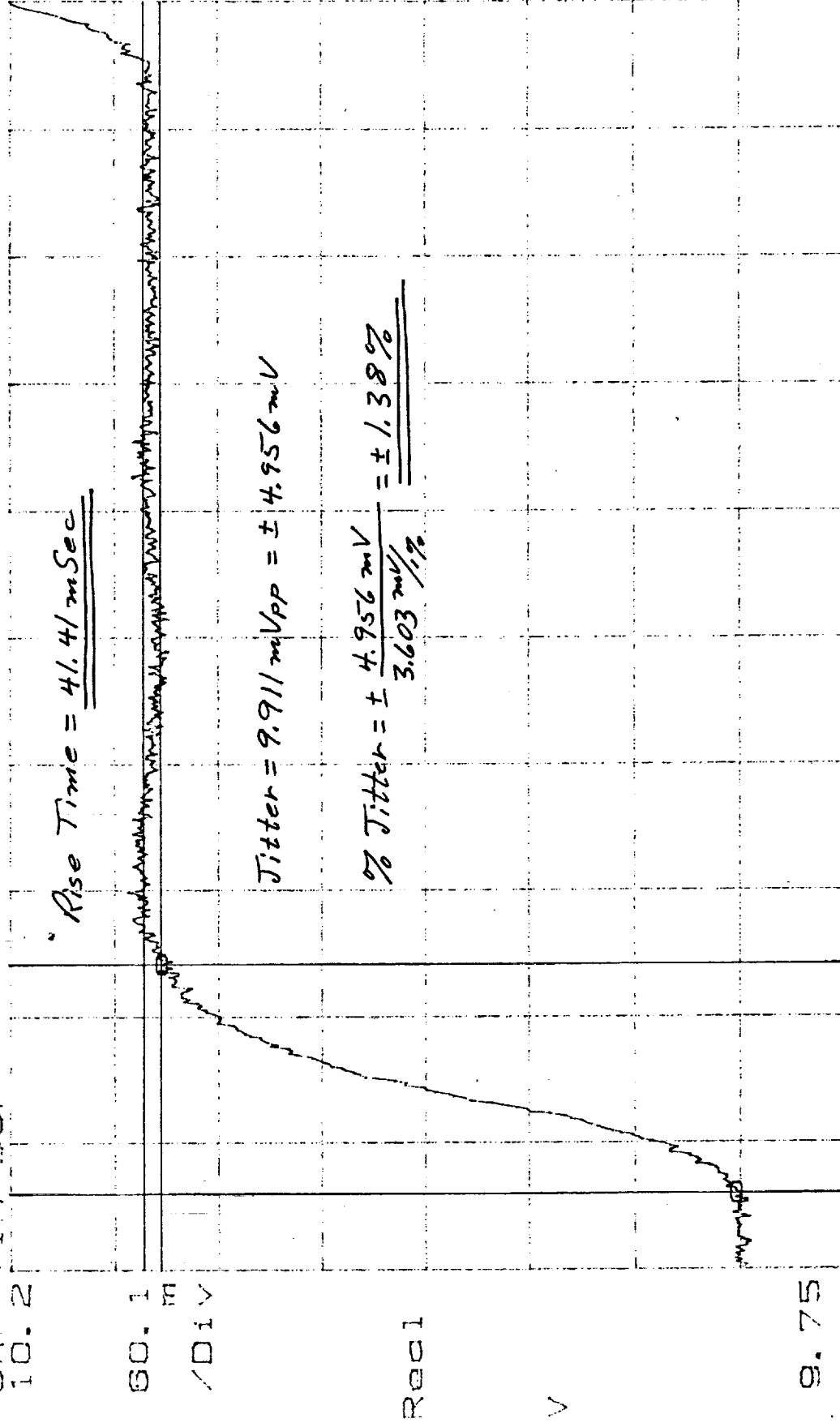
7AP_FSS   2.4

S/O: 335168
P/N: 1331200-2-IT
S/N: 108

Scan Motion and Jitter   Test Engr: ____ Date: 4/20/99
#3,4,5,5   Quality: ____
Step 11-12

B22

$Y=10.1462$ $\Delta Y=18.07mV$

CAP TIM BUF
10.2

60.1 m /Div

Recl

V

9.75   FxdXY 2.17   Sec   7AP.FSS   2.4

+5% limit

Overshoot = 0.0mV

Scan Motion and Jitter
TP 3.4.5.5
Step 11-12

Test Engr: _____ Date: 4/20/63
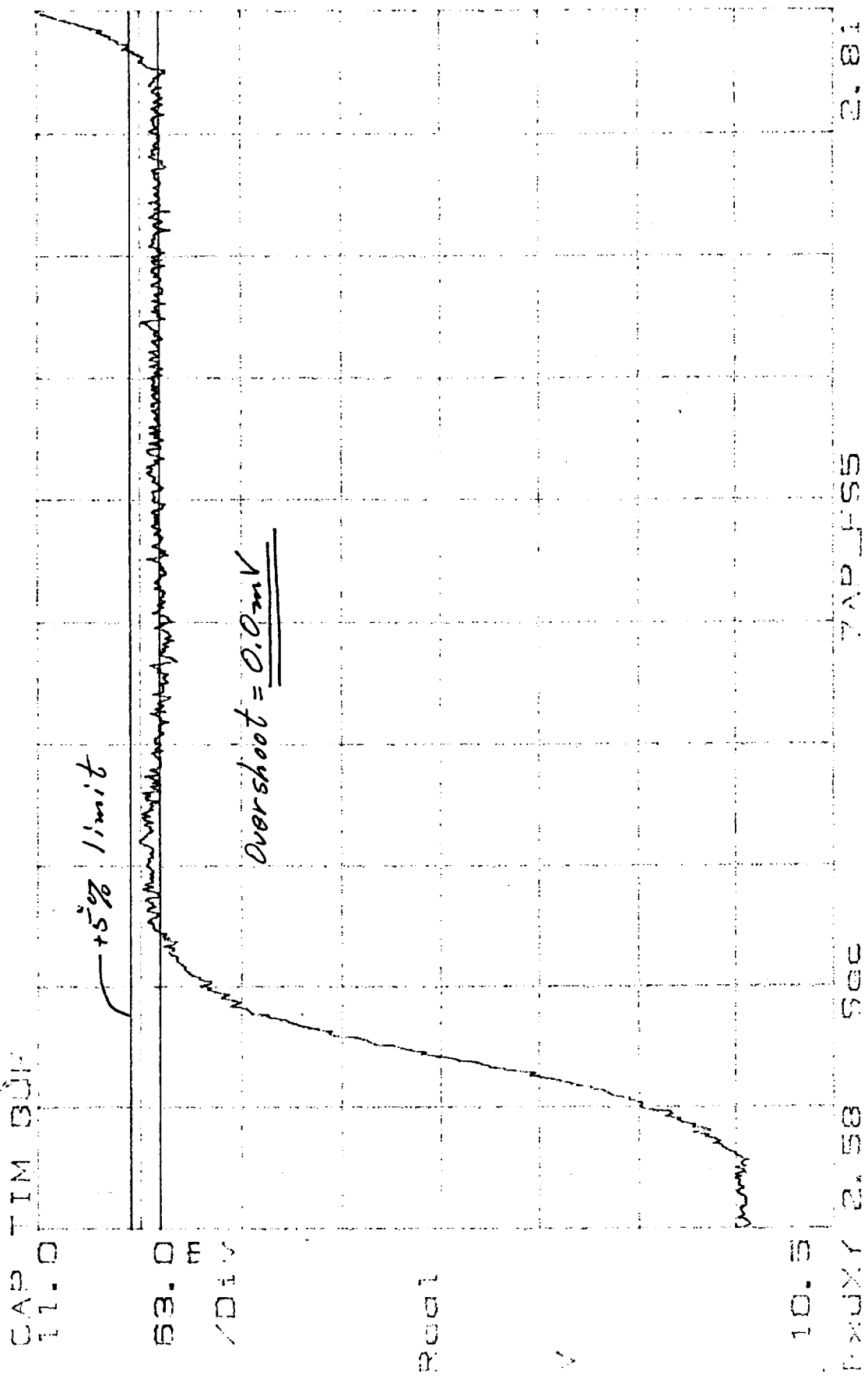Quality: _____ (268)

S/o: 335168
P/N: 1331200-2-IT
s/N: 108

B23

X=2.39 S   ΔX=39.84mS   Y=10.5175   ΔY=7.49mV
Ya=10.1494. ΔYa=360.0mV

CAP TIM BUF
10.6
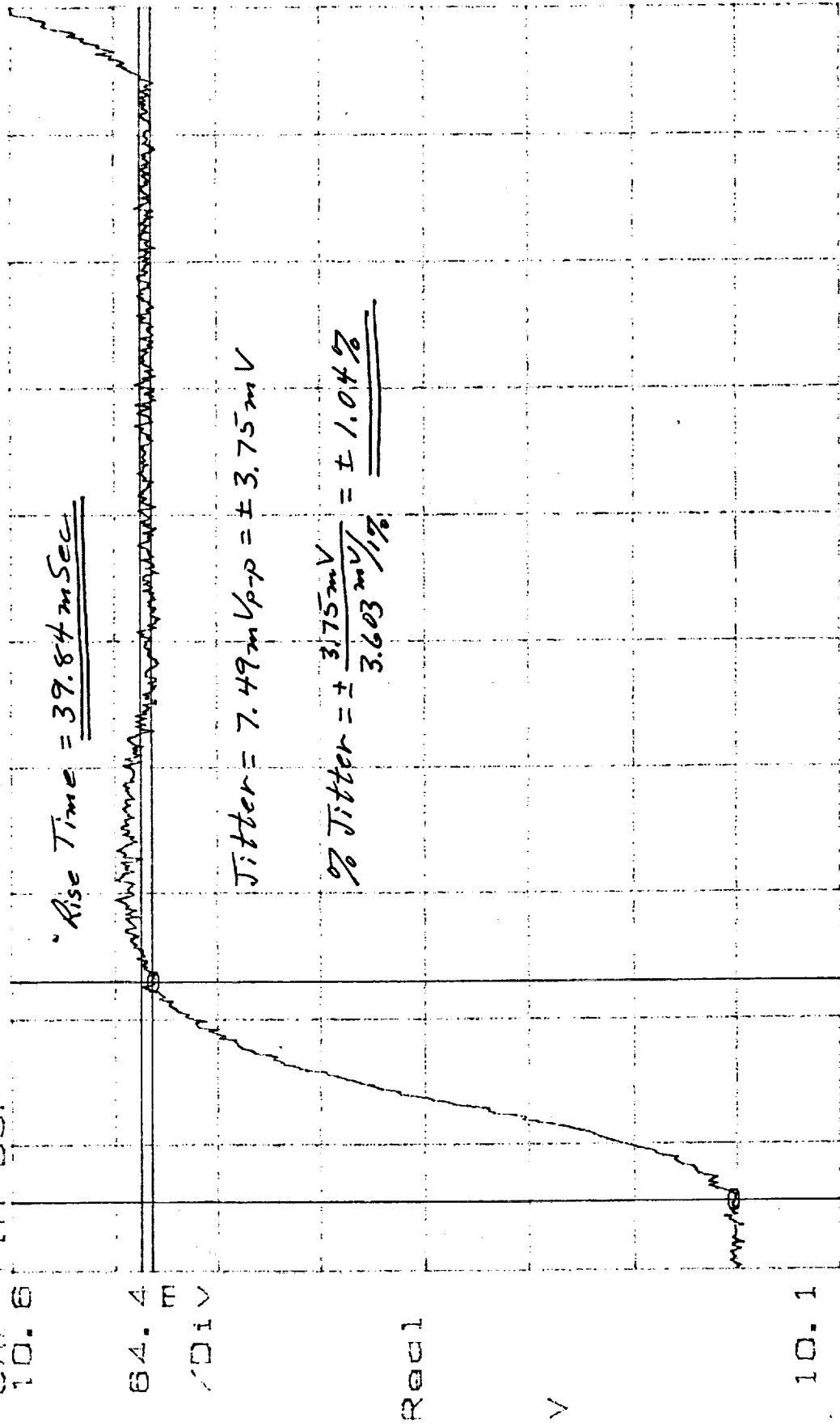
64.4 m
 /Div

Rcl

V

10.1

FXdXY 2.38   Sec

7AP1SS   2.6

"Rise Time = 39.84 mSec

Jitter = 7.49 mVp-p = ±3.75 mV

% Jitter = ± $\frac{3.75 mV}{3.603 \frac{mV}{1\%}}$ = ±1.04%

Scan Motion 2nd Jitter   Test Engr: _____ Date: 4/20/95
IT 3,4,5,5   Quality: _____ 7A 268
Step 12-13

S/o: 335168
P/w: 133,200-2-IT
S/N: 108

B24

Y=10.5119   ΔY=18.1mV

CAP TIM BUF
10.6

+5% Limit

Overshoot = 0.0mV

64.4 mV
/Div

Rool

V

10.1

FRQXY 2.38   Sec   7AP_FSE   2.6

S/O: 335168
P/N: 133 1200-2-IT
S/N: 108

Scan Motion and Jitter
3.4.5.5
Step 12-13

Test Engr: [signature]   Date: 4/20/09
Quality: _____ (TA 268)

B25

X=2.591 S   ΔX=41.8mS   Y=10.8865   ΔY=7.633mV
Ya=10.5127   ΔYa=368.2mV

CAP IN BUF
1.0 E

63.0 E
/Div

"Rise Time = 41.8 mSec

$Jitter = 7.633 mVpp = \pm 3.817 mV$

$\% Jitter = \pm \dfrac{3.817 mV}{3.603 mV/\%} = \pm 1.06\%$

Real

Y

10.5

FxdXY 2.58   Sec   7AP F55   2.81

So: 335768
P/N: 1331200-2-IT
S/N: 108

Scan Motion and Jitter
¶ 3.4.5.5
Step 13-14

Test Engr: _____ Date: 4/2/69
Quality: _____

B26

Y=10.8825   ΔY=18.01mV

CAP TIM BUF
11.0

53.0E
/Div

Rool

10.5

FXDXY 2.58

Sec

7AD_55

2.81

+5% limit

Overshoot = 0.0mV

Scan Motion and Jitter
TP 3.4.5.5
Step 13-14

TestEngr: _____ Date: 4/20/89
Quality: _____

AL
268

S/O: 335168
P/N: 1331200-2-IT
S/N: 108

B27

X=2.834 S   Y=11.2315   ΔY=14.34mV

Ya=11.2149

ΔX=39.06mS
ΔYa=330.9mV

CAP TIM BU:
11.3

58.0 m
/Div

Real

10.8

I=dXY 2.78   Sec   7APS_155   3.01

"Rise Time = 39.06 mSec

Jitter = 14.34 mVpp = ±7.17 mV

% Jitter = ±$\frac{7.17 mV}{3.603 mV/\%}$ = ±1.99%

S/O: 335168
P/N: 131200-2-IT
S/N: 108

Scan Motion and Jitter
¶ 3.4.5.5
Step 14-15

Test Engr: _____ Date: 4/20/65
Quality: _____

268

828
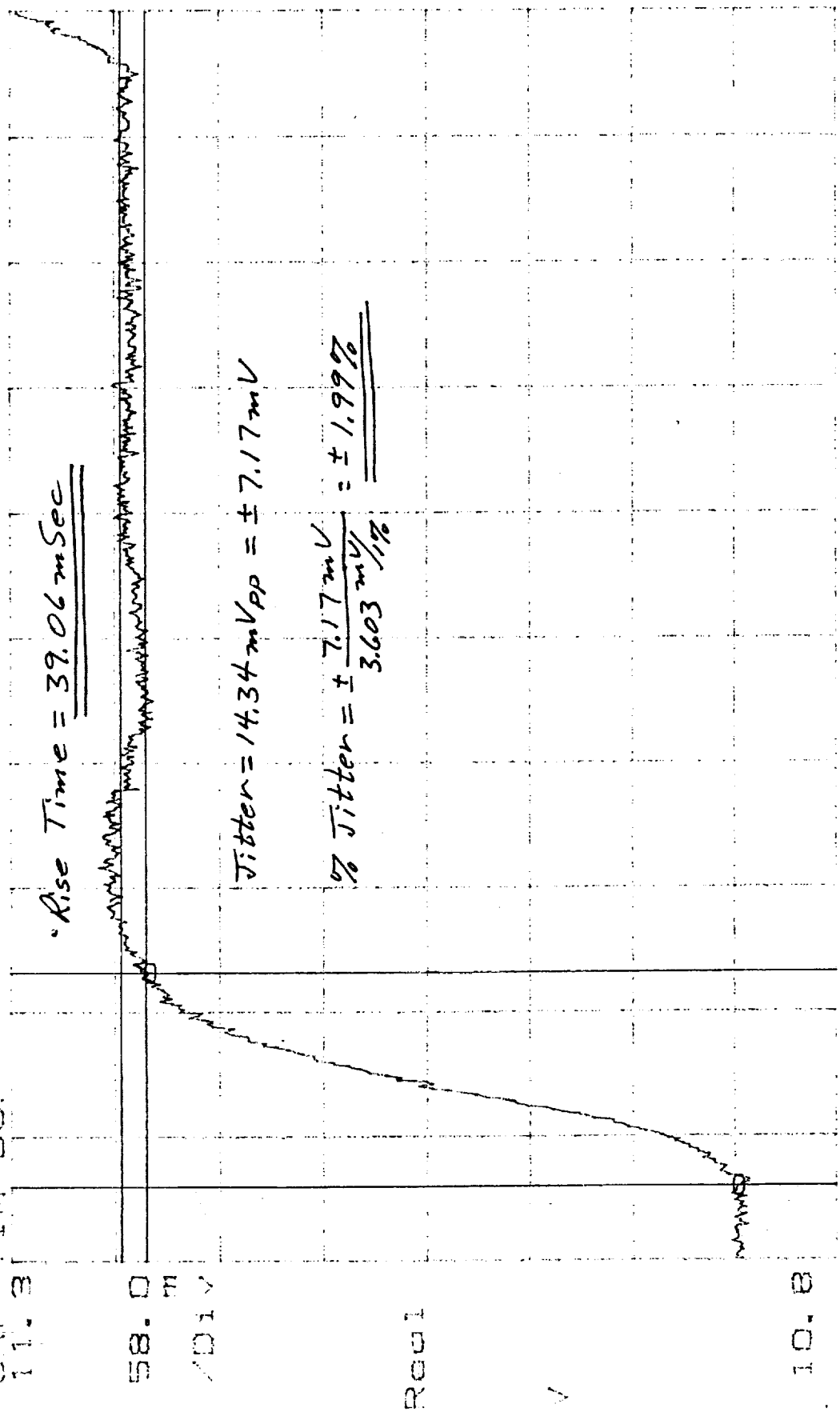
Y=11.2254   ΔY=18.0mV

CAP TIM GUP
11.3

58.0 /Div

+5% limit

Overshoot = 0.0 mV

Real

10.8

FREXY 2.78   Sec   7AP_FSS   3.01

Scan Motion and Jitter
TT 3.4.5.5
Step 14-15

Test Engr: D Singh   Date: 4/20/69
7A 268
Quality:

S/O: 335168
P/N: 1331200-2-IT
S/N: 108

B29

X=2.999 S ΔX=41.02mS Y=11.5891 ΔY=9.842mV
Ya=11.2279 ΔYa=348.7mV
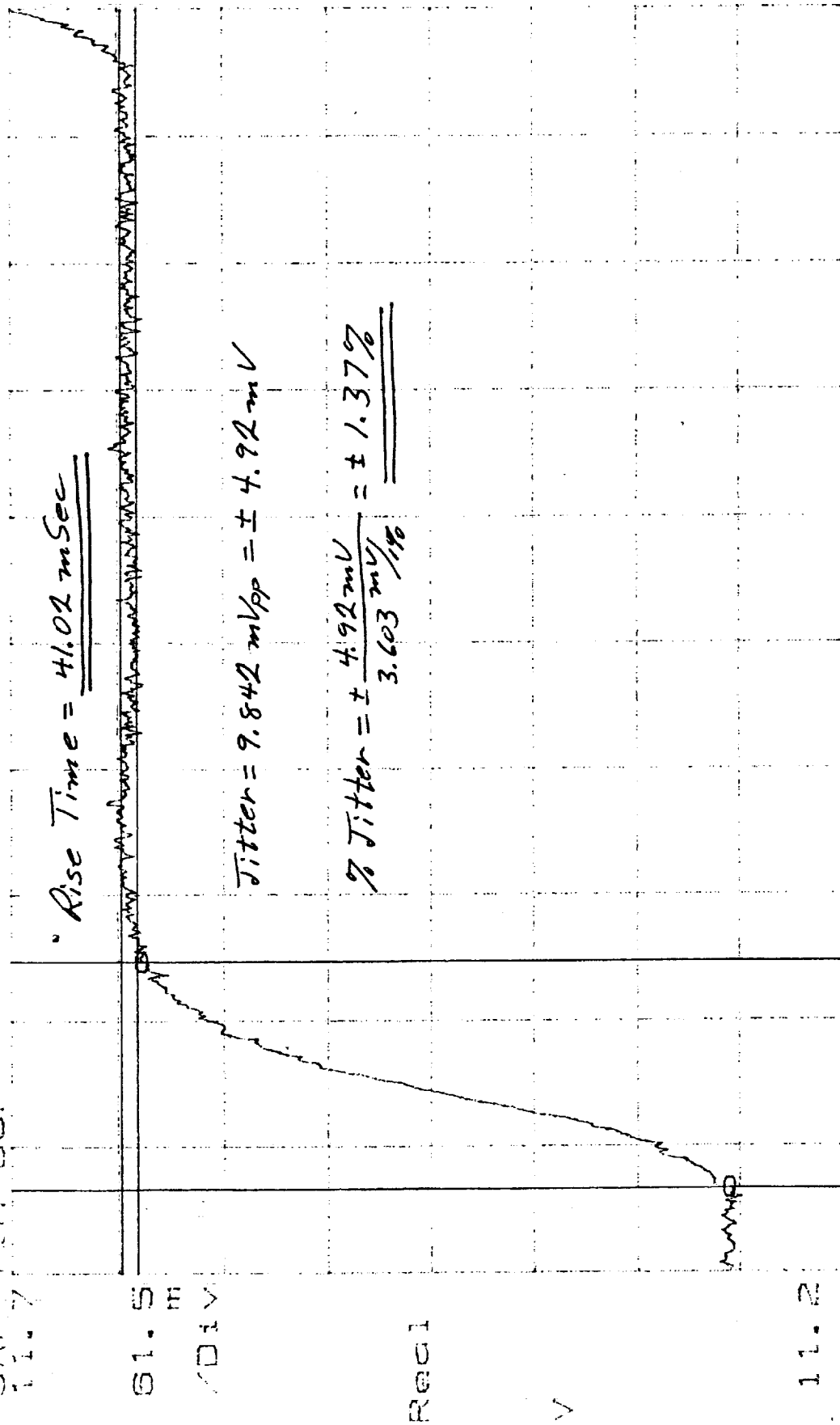
CAP TIM BUF
11.7

61.5 m /Div

Rise Time = 41.02 mSec

$Jitter = 9.842\ mVpp = \pm 4.92\ mV$

$\%\ Jitter = \pm \dfrac{4.92\ mV}{3.603\ mV/\%} = \pm 1.37\%$

Reg1

V

11.2

FrdNY 2.98 Sec 7AP FSS 3.21

Scan Motion and Jitter
IT 3.4.5.3
Step 15-16

Test Engr: ____ Date: 4/20/99
Quality: (7A 268)

S/0: 335168
P/N: 131/200-2-IT
S/N: 1108

B30

Y=11.5828   ΔY=17.89mV

CAP TIM BUF
11.7

61.5 m
/DIV

Real

V

11.2

FMXY 2.98   Sec   7AP_FSS   3.21

+5% limit

Overshoot = 0.0mV

Scan Motion and Jitter
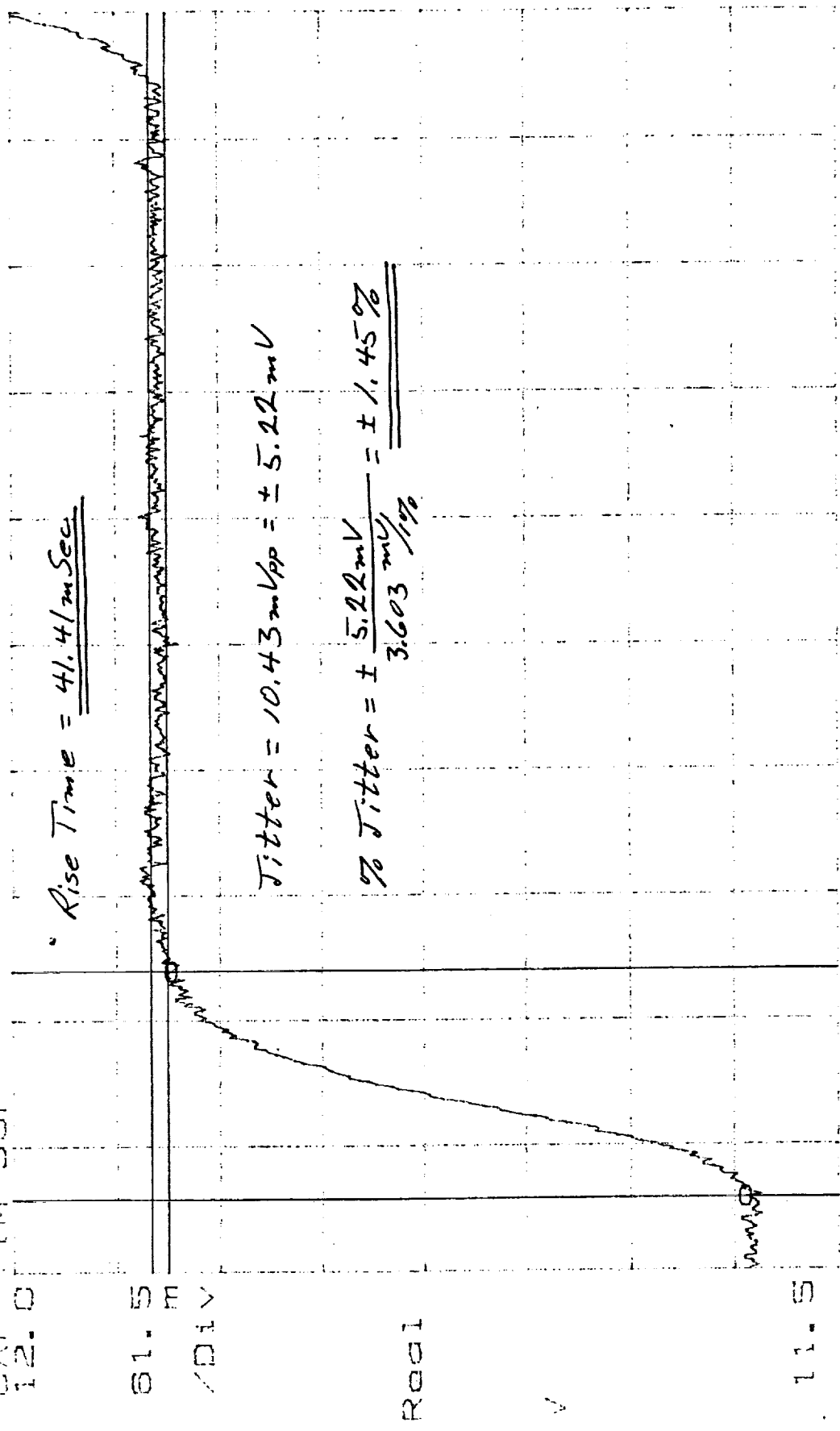IT 3.4.5.5
Step 15-16

S/o: 335/68
P/N: 133/200-2-IT
S/N: 108

Test Engr: Date: 4/20/92
Quality:

B31

X=3.242S ΔX=41.41mS Y=11.9444 ΔY=10.43mV
Ya=11.9318 ΔYa=342.2mV

CAP TIM BUF
12.0

61.5
m
/Div

Rool

11.5
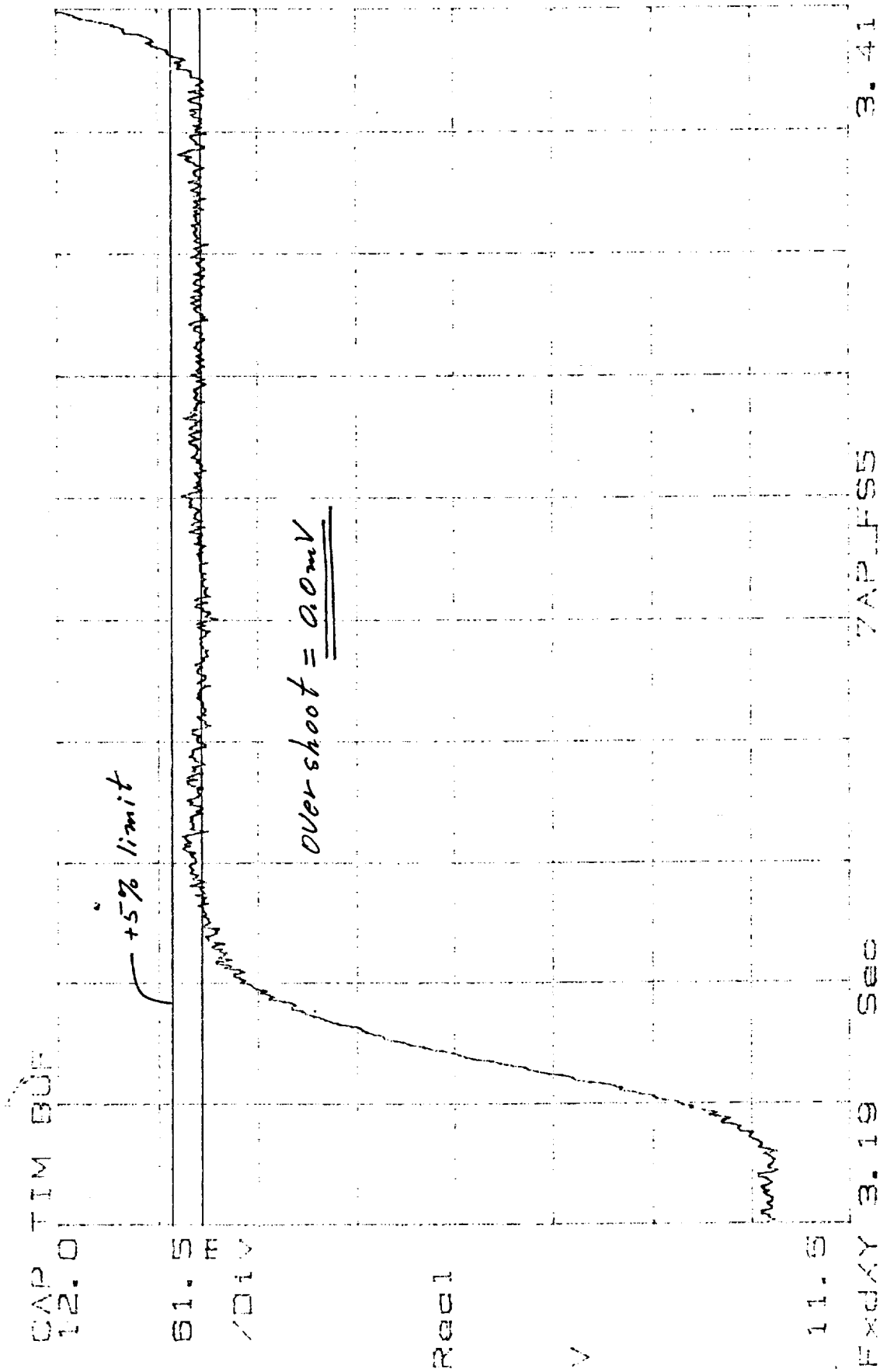
FxdXY 3.19

Sec

7AP FSS

3.41

" Rise Time = 41.41 mSec

Jitter = 10.43 mVpp = ± 5.22 mV

% Jitter = ± $\frac{5.22 mV}{3.603 mV/\%}$ = ± 1.45 %

S/O: 335168
P/N: 1331200-2-IT
S/N: 108

Scan Motion and Jitter
TT 3.4.5.5
Step 16-17

Test Engr: _____ Date: 4/20/99
Quality: _____
(Ⓣ 268)

B32

Y=11.9381   ΔY=18.18mV

CAP TIM BUF
12.0

61.5 E
/Div

Real

V

11.5

ExΔY 3.19   Sec   3.41

7AP-FSS

+5% limit

Overshoot = 0.0mV

Scan Motion and Jitter
TP 3.4.5.5
Step 16-17

Test Engr: *(signature)* Date: 4/20/99
Quality: *(signature)*
(7A 268)

S/O: 335/68
P/N: 133/200-2-IT
S/N: 108

B33

X=3.402 S   Y=12.297   ΔY=11.19mV

Ya=11.9382   ΔX=41.41mS
              ΔYa=347.1mV

CAP TIM BUF
12.4

59.2
E
/Div

Rael

11.9

V

F=dXY 3.39   Sec   7APJ'55   3.62

"Rise Time = 41.41 m Sec

Jitter = 11.19mVpp = ± 5.60mV

% Jitter = $\dfrac{\pm 5.60mV}{3.603mV/1\%}$ = ±1.55%

Scan Motion and Jitter
TP 3.4.5.5
Step 17-18

B34

Y=12.2898   ΔY=18.07mV

CAP TIM BUF
12.4

59.2 E
/Div

Recl

V

11.9   FxdX1 3.39   Sec

+5% limit

Overshoot = 0.0mV

Scan Motion and Jitter
TT 3.4.5.5
Step 17-18

7A.P. FSS   3.62
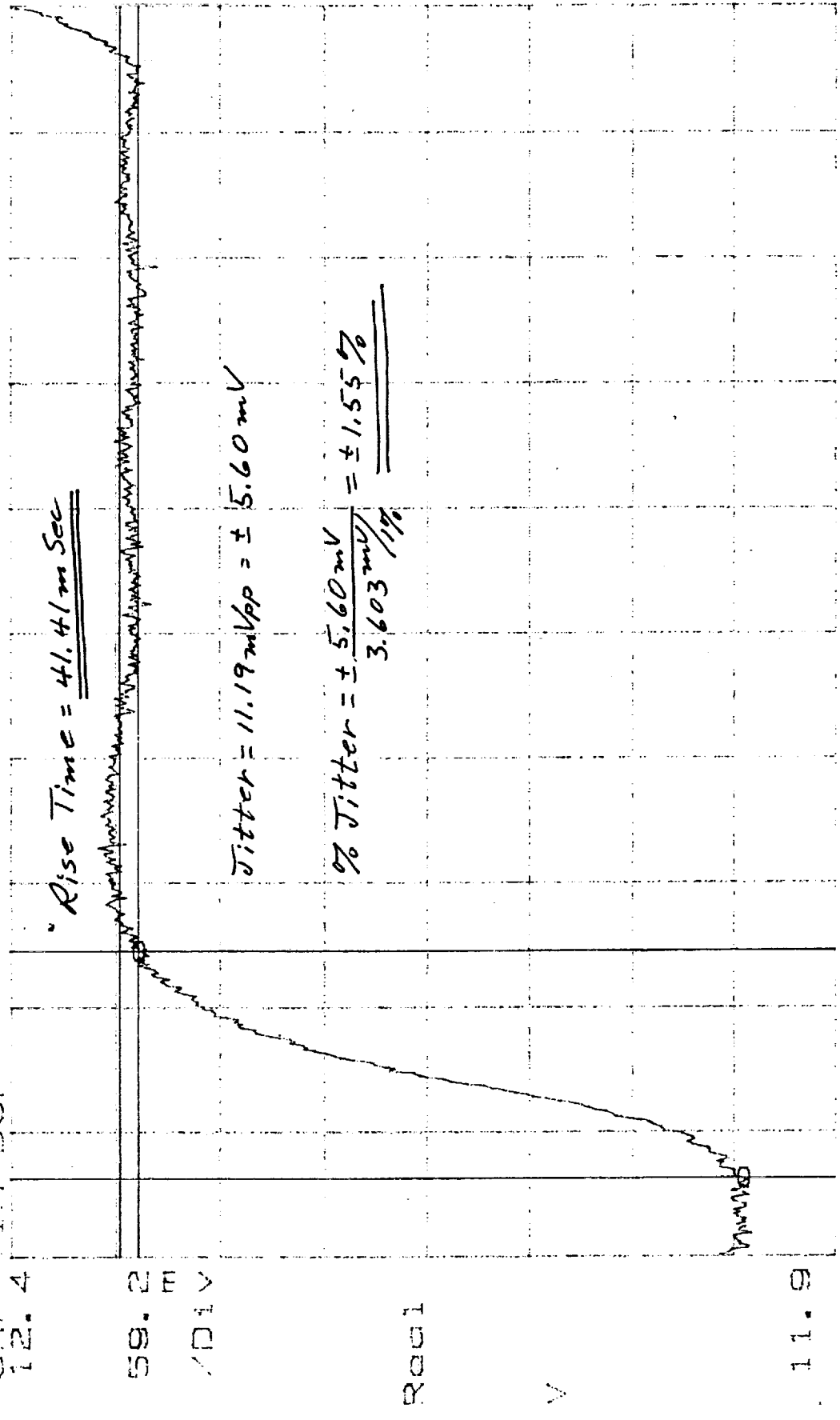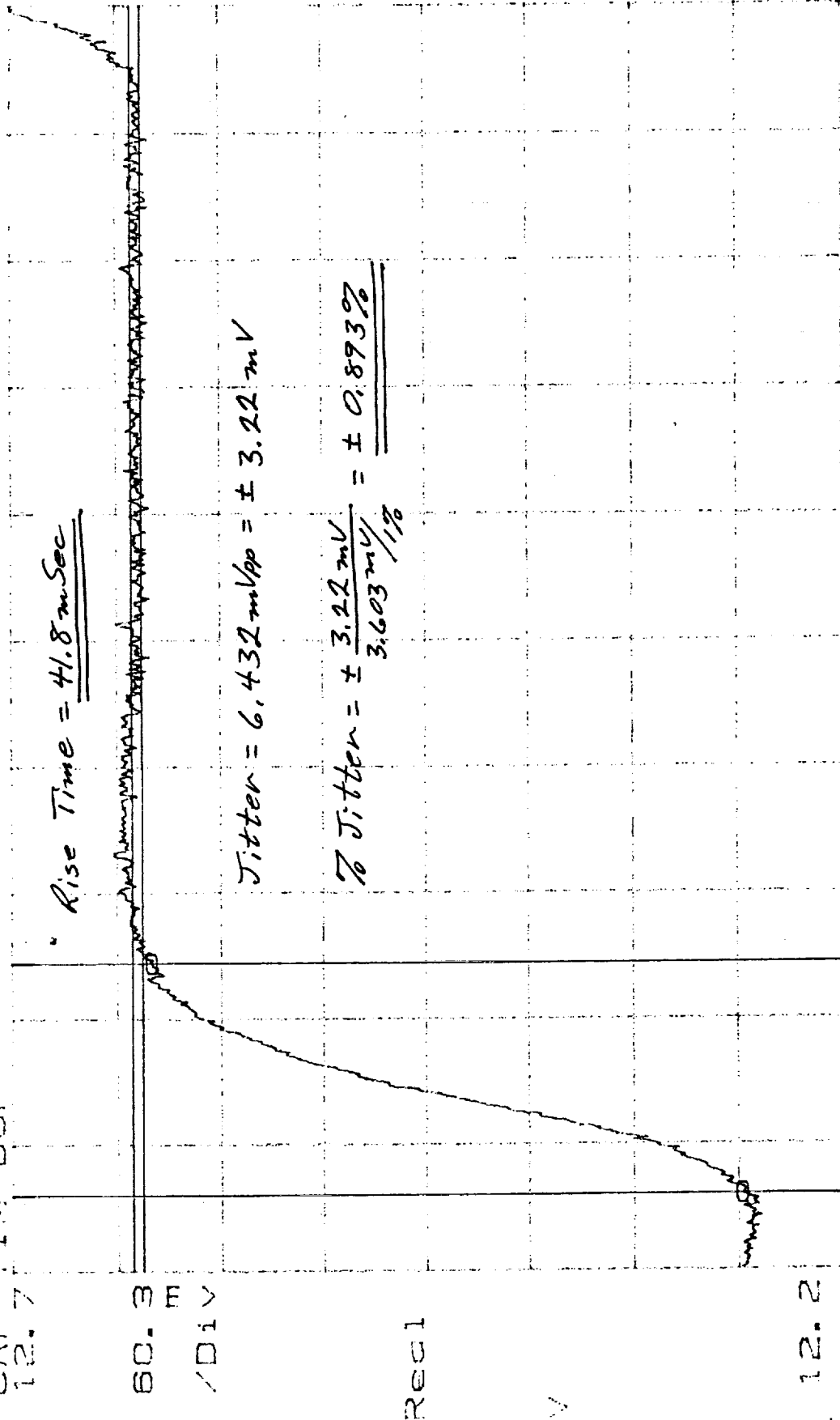
S/O: 335168
P/N: 1331200-2-IT
S/N: 108

Test Engr: _____ Date: 4/21/99
Quality: _____

B35

X=3.605 S   ΔX=41.8mS   Y=12.6492   ΔY=6.432mV
Ya=12.2934   ΔYa=343.8mV

CAP TIM BUF
12.7

60.3 mE
/Div

Recl

12.2

V

FxoXY 3.59   Sec   7AP FS5   3.82

* Rise Time = 41.8 mSec

Jitter = 6.432 mVpp = ± 3.22 mV

% Jitter = ± $\frac{3.22 \, mV}{3.603 \, mV / 1\%}$ = ± 0.893%

Scan Motion and Jitter   Test Engr: D. [signature]   Date: 4/21/55
IT 3.4.5.5   Quality: [signature] (7A 268)
Steps 18-19

S/O: 335168
P/N: 133/200-2-IT
S/N: 108

B36

Y=12.6454   ΔY=17.82mV

CAP TIM B↓
12.7

60.3

/Div

Real

12.2

FxdXY 3.59   Sec   XAP 1.55   3.82

+5% limit

Overshoot = 0.0mV

Scan Motion and Jitter
π 3.4.5.5
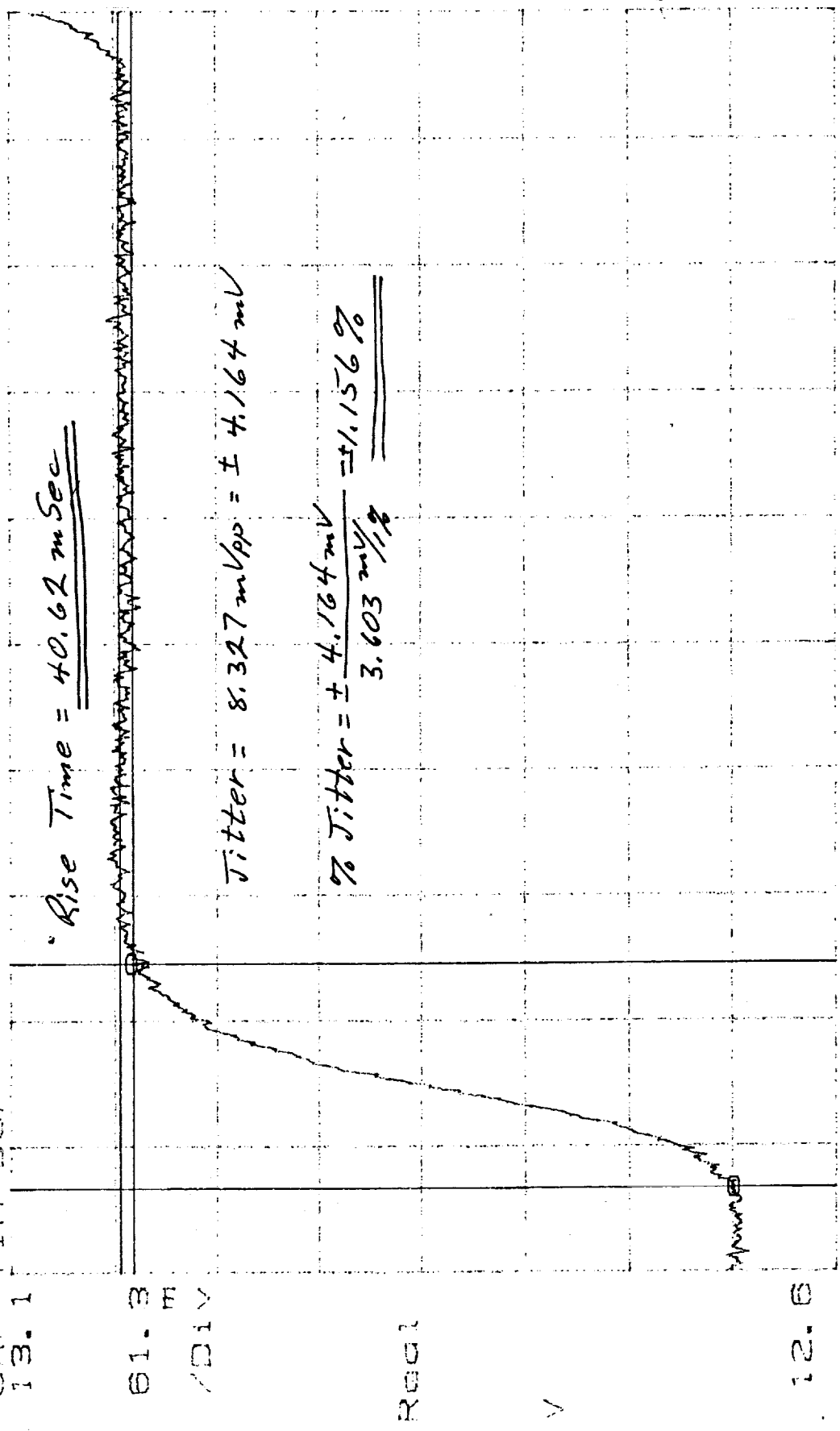Step 18-19

S/o: 335168
P/N: 131/200-2-IT
S/N: 108

Test Engr. O____ Date: 4/21/99
Quality: (TA 268)

B 37

X=3.807 S   ΔX=40.62mS   Y=13.0128   ΔY=8.327mV
Ya=12.647   ΔYa=358.4mV

CAP TIM BUF
13.1

61.3 m
/Div

"Rise Time = 40.62 mSec

Jitter = 8.327 mVpp = ± 4.164 mV

% Jitter = ± $\frac{4.164 mV}{3.603 mV/\%}$ = ±1.156%

Real

V

12.6

FxdXY 3.79   500   7AP.FSS   4.02

s/o 335168
P/W:133/200-2-IT
s/n: 108

Scan Motion and Jitter
π 3.45.5
step 19-20

Test Engr: _____ Date: 4/21/??
Quality: _____ (B92) YL

B38

Y=13.0083   ΔY=18.14mV

+5% limit

Overshoot = 0.0mV

CAP TIM GJ-
13.1

61.3 F
/Div

Rear1

V

12.6

FXDXY 3.79   Sec   7APR-95

Scan Motion and Jitter
P 3.4.5.5
Step 19-20

S/O: 335168
P/N: 133/200-2-IT
S/N: 108

Test Engr: _____ Date: 4/4/??
Quality: _____   4.02

B39

X=4.011 S   Y=13.3607   ΔY=10.04mV
Ya=13.0103   ΔX=41.02mS
ΔYa=337.3mV

$Rise\ Time = 41.02\ mSec$

$Jitter = 10.04\ mVpp = \pm 5.02\ mV$

$\%\ Jitter = \pm \dfrac{5.02\ mV}{3.603\ mV/1\%} = \pm 1.39\%$

57.5 m

'Div

Rac1

V

13.0

Sec

VAP_FSS

4.22

Scan Motion and Jitter
T 3.4.5.5
Step 20-21

S/o: 335/68
P/W: 1331200-2-IT
S/N: 108

Test Engr: _____ Date: 4/6/88
Quality: _____

B40

Y=13.3545   ΔY=18.13mV

CAP TIM 50r
13.4 -IT

+5% limit

Overshoot = 0.0mV

57.5 m /Div

Rel

13.0

FxdXY 4.0   Sec   7AP.FSS

V

S/O: 335168
P/N: 1331200-A-IT
S/N: 108

Scan Motion and Jitter
TP 3.4.5.5
Step 20-21

Test Engr _____ Date: 4/2/92
Quality: _____ (AL 298)

B41

X=4.212 S   Y=13.7174   ΔY=11.39mV
Ya=13.3492   ΔX=41.8mS
              ΔYa=356.8mV

CAP TIM BUF
13.8

60.2 mE

/Div

Rcl

V

13.3
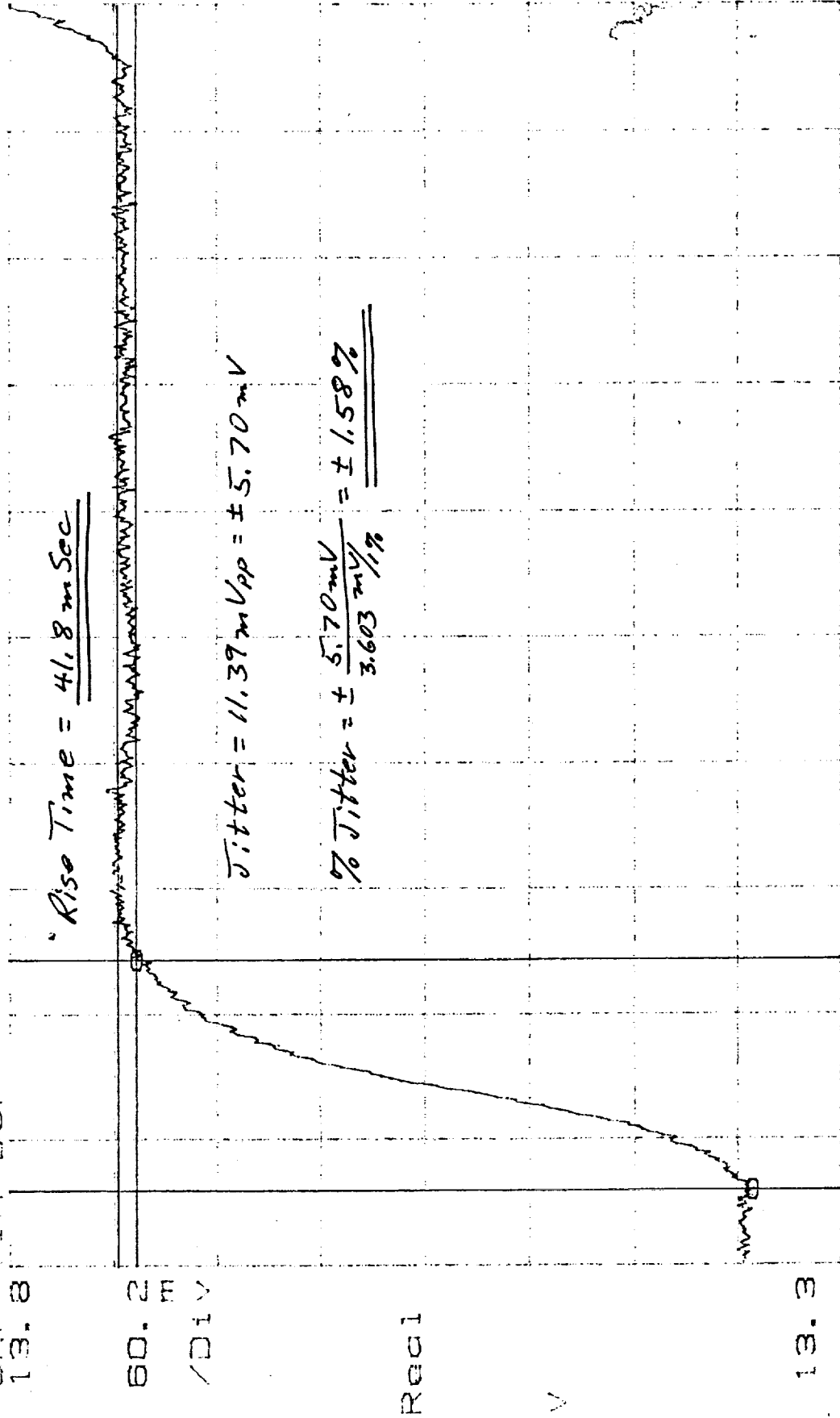
FixdXY 4.2

Sec   7AP_FS5   4.43

"Rise Time = 41.8 mSec

Jitter = 11.39 mVpp = ±5.70mV

% Jitter = ± $\frac{5.70mV}{3.603 mV/1\%}$ = ±1.58%

Scan Motion and Jitter
TP 3.4.6.5
step 21-22

Test Engr: David   Date: 4/4/85
Quality:

S/O: 335168
P/N: 1331200-2-IT
S/N: 108

B42

$Y=13.7114$ $\Delta Y=17.98mV$

CAP TIM BUF
13.8

59.8 m

/Div

Real

13.3

FxdXY 4.2

"+5% limit"

Overshoot = 0.0mV

Sec

A.43

7AP.F.55

Scan Motion and Jitter
¶ 3.4.5.5
Step 21-22

B43

X=4.456 S   ΔX=41.41mS   Y=14.0755   ΔY=12.1mV
Ya=14.0612   ΔYa=347.1mV

CAP TIM BUF
14.1mV
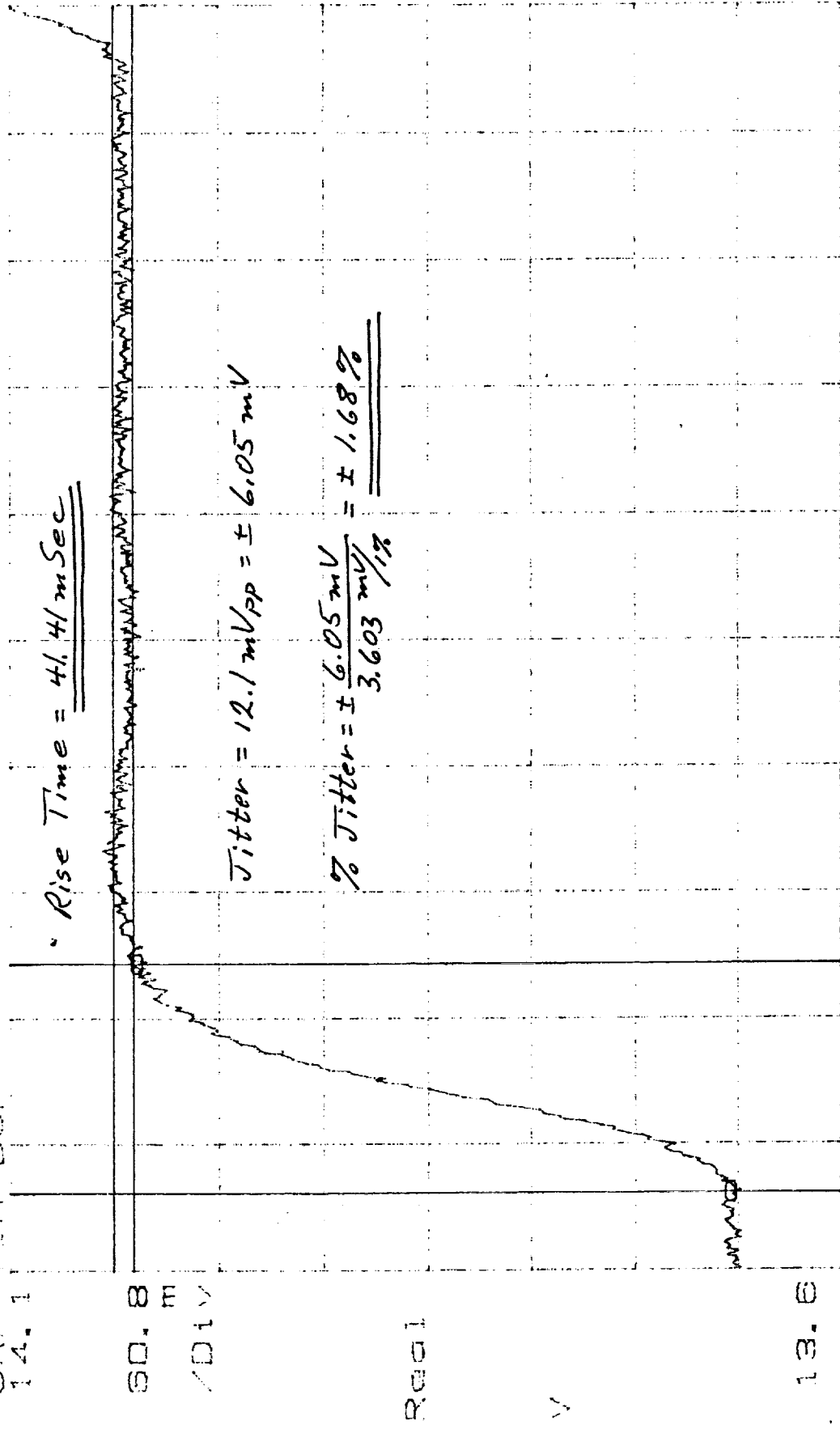
60.8 m
/Div

Real

V

13.6

FxdXY 4.4   Sec   7AP_FS5   4.63

"Rise Time = 41.41 mSec

Jitter = 12.1 mV_{PP} = ± 6.05 mV

% Jitter = ± $\dfrac{6.05 mV}{3.603 mV/\%}$ = ± 1.68 %

Scan Motion and Jitter Test Engr: [signature] Date: 4/2/96
Π 3.4.5.5
Step 22-23
Quality: [signature]

S/O: 335/68
P/N: 133/200-2-IT
S/N: 108

B44

X=4.456 S   Y=14.0696 ΔY=18.0mV
Ya=14.0612 ΔX=41.41mS ΔYa=347.1mV
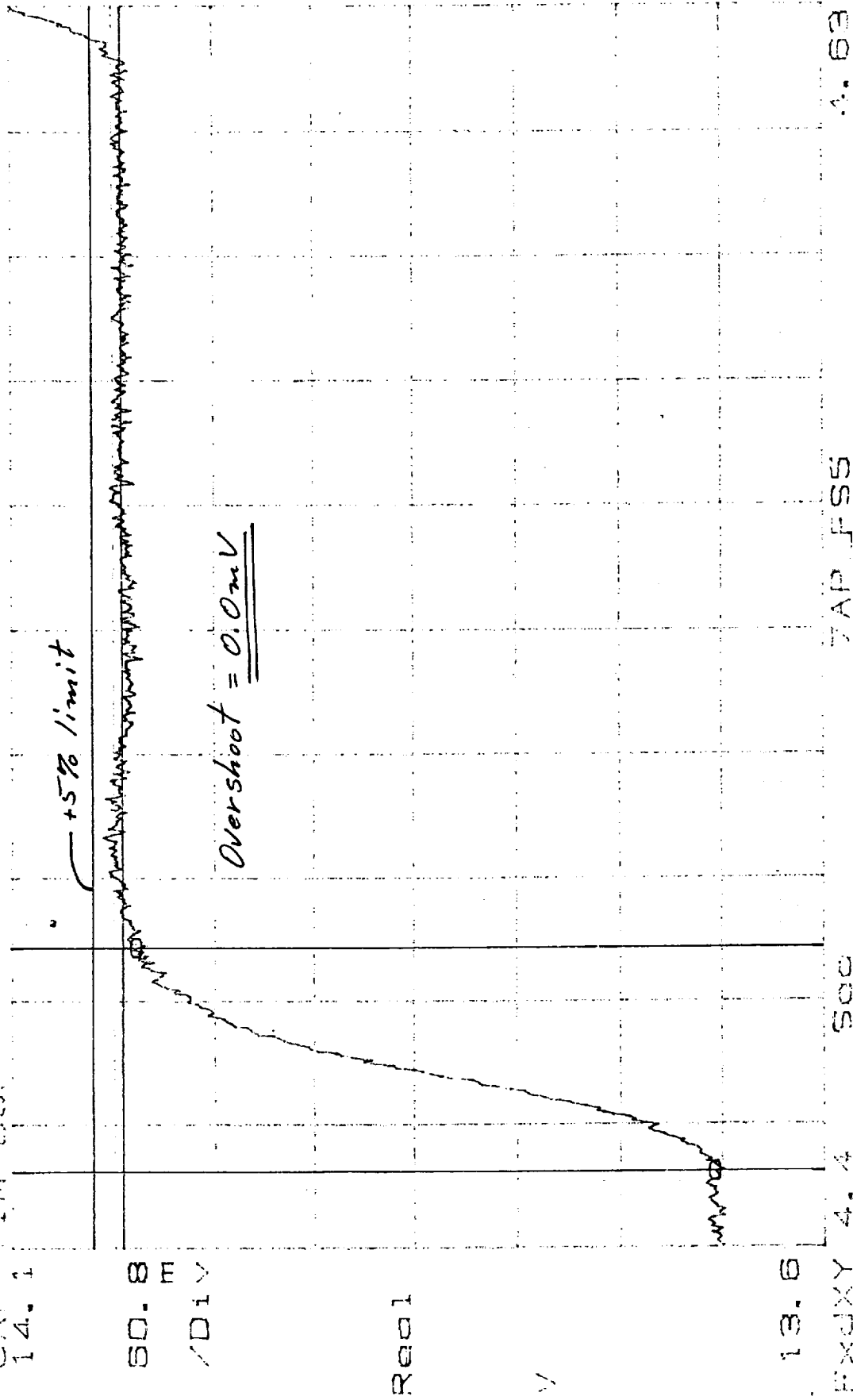
CAP TIM BUR
14.1

50.8 E
/Div

Real

y

13.6

FXJXY 4.4

+5% limit

Overshoot = 0.0mV

SOC   7AP FSS   1.63

S/O: 335768
P/N: 131/200-2-IT
S/N: 108.

Scan Motion and Jitter   Test Engr: _____ Date: 4/4/62
Quality:
π 3.4.5.5
Step 22-23

B45

X=4.657 S ΔX=39.84mS Y=14.4291 ΔY=14.29mV
Ya=14.4131 ΔYa=340.6mV

CAP TIM DIV.
14.5

62.7 m /Div

Rcel

V

14.0

FXJXY 4.61 Sec

"Rise Time = 39.84 mSec

Jitter = 14.29 mVpp = ± 7.15 mV

% Jitter = ± $\frac{7.15 mV}{3.603 mV/\%}$ = ± 1.98 %

7AP FS5   4.83

Scan Motion and Jitter   Test Engr: _____ Date: 4/2/89
IT 3.4.5.5   Quality: _____ 7A 268
Step 23-24

S/O: 335-168
P/N: 133/200-2-IT
S/N: 108

846

Y=14.4221   ΔY=17.94mV

CAP TIM BUF
14.5

+5% limit

62.7
m
/Div

Overshoot = 0.0mV

Real

V

14.0

FxDXY 4.61   Sec   7AP.FSS   4.23

S/o: 335168
P/N: 133/200-2-IT
s/n: 108

Scan Motion and Jitter   Test Engr: [signature]   Date: 4/21/99
TP 3.4.5.5   Quality: [signature] (TA 268)
step 23-24

B47

X=4.86 S   ΔX=41.41mS   ΔY=8.022mV
Ya=14.7651   ΔYa=340.6mV   Y=14.7683

CAP TIM BU.
14.8

59.1   m
'Div

Rec1

14.4

1:xdXr 4.81   Sec   7AP.55   5.03

"Rise Time = 41.41mSec

Jitter = 8.022mVpp = ± 4.011mV

%Jitter = ± $\frac{4.011mV}{3.603 mV/1\%}$ = ± 1.11%

S/O: 335168   Scan Motion and Jitter   Test Engr: [signature] Date: 4/21/88
P/N: 1331200-2-IT   π 3.4.5.5   Quality: _____
S/N: 108   Step 24-25

B48

Y=14.7715   ΔY=18.05mV

CAP TIM B.J.

12.8

50.1 P/Div

Real

14.4

FrqXY 4.81 Sec

+5% limit

Overshoot = 0.0 mV

7AP-F55   5.03

SO: 335168
P/N: 1331200-A-IT
S/N: 108

Scan Motion and Jitter   Test Engr: Daniel   Date: 4/4/99
TP 3.4.5.5   Quality: (7A 268)
step 24-25

B49

X=5.064 S   ΔX=41.8mS   Y=15.1439   ΔY=13.83mV
Ya=15.1316   ΔYa=355.2mV

"Rise Time = 41.8 mSec

Jitter = 13.83 mVpp = ± 6.92 mV

% Jitter = ± $\dfrac{6.92\,mV}{3.603\,mV/\%}$ = ± 1.92%

S/O: 335168
P/N: 133/200-2-IT
S/N: 108

Scan Motion and Jitter
TT 3.4.5.5
Step 25-26

Test Engr: _____ Date: 4/26/89
Quality: (TA 268)

850

Y=15.1377   ΔY=18.13mV

CAP TIM BUT
15.2

53.4 m
/Div

+5% limit

Overshoot = 0.0mV

14.7

Expand 5.01   Sec   TAPLESS   5.24

Real

Scan Motion and Jitter
P 3.4.5.5
Step 25-26

Test Engr: _____ Date: 4/4/92
Quality: (7A 268)

S/O: 335168
P/N: 1331200-2-IT
S/N: 108

BSI

X=5.226 S   Y=15.4997 ΔY=13.57mV
Ya=15.1397 ΔX=40.23mS
             ΔYa=343.8mV

'Rise Time = 40.23 mSec

Jitter = 13.57 mV_{pp} = ± 6.79 mV

% Jitter = $\dfrac{\pm 6.79mV}{3.603\,mV/\%}$ = ± 1.88%

Scan Motion and Jitter
P 3.4.5.5
Step 26-27

S/O: 335/68
P/N: 133/200-A-IT
S/N: 108

Test Engr: _____ Date: 4/2/99
Quality: _____

B52

Y=15.4944   ΔY=18.12mV

CAP TIM BUF
15.5

62.3 m
/Div

+5% limit

Overshoot = 0.0mV

Root

V

15.1

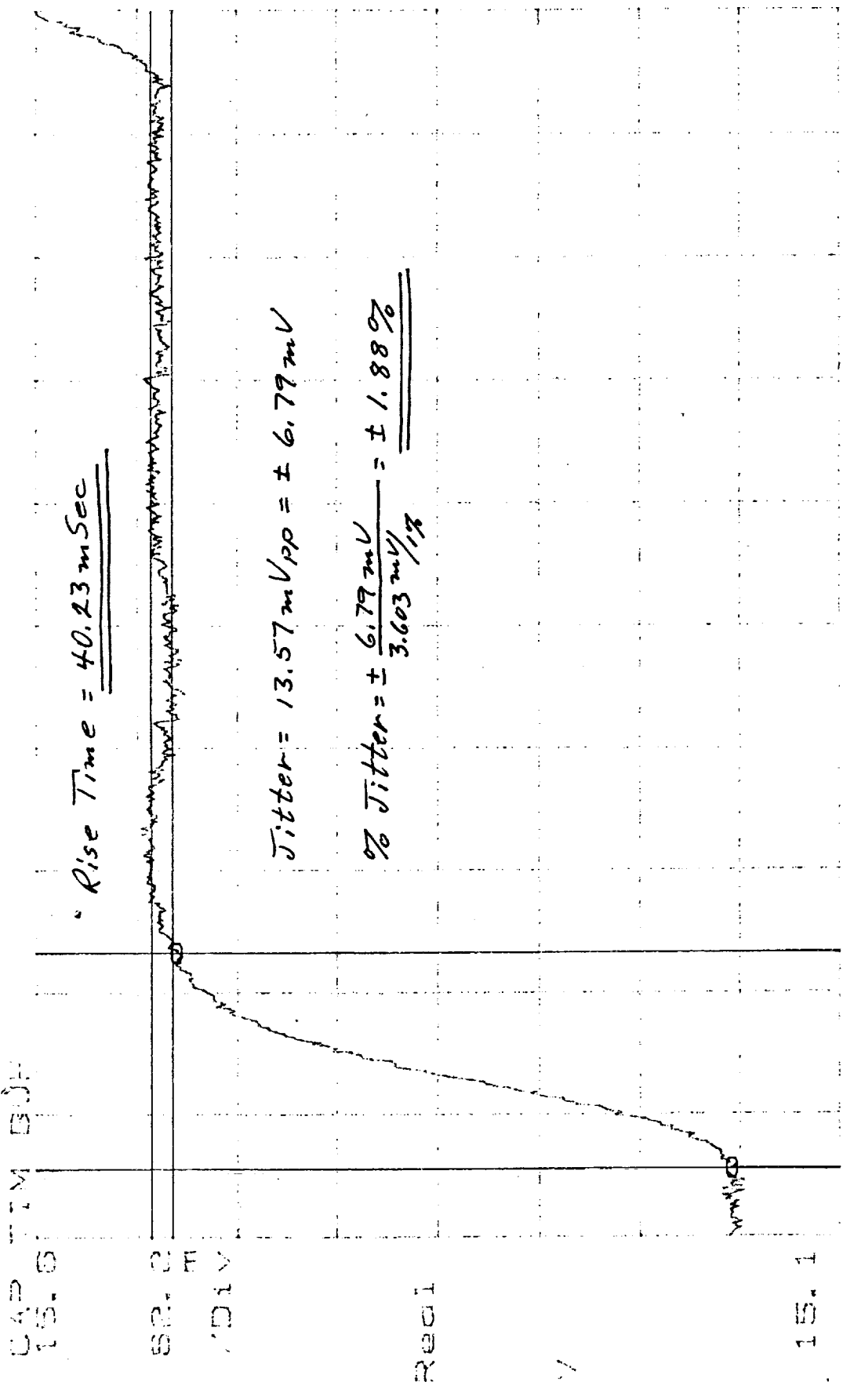FxdXY 5.21   Sac   7AP FSS   5.44

S/o: 335168   Scan Motion and Jitter   Test Engr: D. Strand   Date: 4/21/92
P/N: 1331200-2-IT   TP 3.4.5.5   Quality: 7A 268
S/N: 108   step 26-27

1353

X=5.427 S ΔX=41.8mS Y=15.8539 ΔY=10.58mV
Ya=15.4933 ΔYa=348.7mV

CAP TIM BUF
15.9

62.4 m
/Div

'Rise Time = 41.8 mSec

$\overline{Jitter} = 10.58mV_{pp} = \pm 5.29mV$

$\% Jitter = \pm \dfrac{5.29mV}{3.603 mV//1\%} = \pm 1.47\%$

Recol

FREQX 5.41   Sec   7AP_FSS   5.64

15.4

s/o: 335168
P/N: 133/200-2-IT
s/n: 108

Scan Motion and Jitter   Test Engr: David
TP 3.4.5.5
step 27-28
Quality: David
(7A 268)

B54

Y=15.8476   ΔY=18.14mV

CAP TIM BUF
15.9

62.4
mE
/Div

+5% limit

Overshoot = 0.0mV

Real

15.4

FxdXY 5.41   Sec   7AP_F55   5.64

Scan Motion and Jitter
¶ 3.4.5.5
Step 27-28

Test Engr: _David_ Date: 4/21/99
Quality: (7A 268)

S/6: 335168
P/N: 133120U-2-IT
S/N: 108

BSS

X=5.63 S   Y=16.2153   ΔY=12.07mV
ΔX=41.41mS
Ya=15.8468   ΔYa=356.8mV

"Rise Time = 41.41 mSec

$Jitter = 12.07\,mVpp = \pm 6.035\,mV$

$\% \, Jitter = \pm \dfrac{6.035\,mV}{3.603\,mV/1\%} = \pm 1.68\%$

60.7
/DIV

Rool

V

15.8

FxdY 5.52   Sec   7AP ISS   5.84

Scan Motion and Jitter   Test Engr: David _____ Date: 4/4/89
IT 3.4.5.5   Quality: _____ (7A 269)
Step 28-29

S/O: 335168
P/N: 1331200-2-IT
S/N: 108

B56

Y=16.2082   ΔY=17.96mV

CAP TIM BUF
16.3

60.7
/Div

Reel

15.8
FxdXY 5.62   Sec   7AP_555   5.84

+5% limit

Overshoot = 0.0mV

S/o: 335168
P/N: 133 1200-2-IT
S/N: 108.

Scan Motion and Jitter   Test Engr: _____ Date: 4/4/88
#3.4.5.5   Quality: _____ (7A 268)
step 28-29

B57

X=5.832 S   Y=16.5853   ΔY=12.98mV
Ya=16.2085

ΔX=40.23mS
ΔYa=361.7mV

Rise Time = 40.23 mSec

$Jitter = 12.98\,mVpp = \pm\,6.49mV$

$\%Jitter = \pm\,\dfrac{6.49\,mV}{3.603\,mV/\%} = \pm\,1.80\%$

CAP TIN B...
15.6

62.2 m/Div

Root

15.1

FKJKY 5.82 Sec   /AP.FSS   6.05

S/O: 335168
P/N: 1331200-2-IT
S/N: 108

Scan Motion and Jitter
¶3.4.5.5
Step 29-30

Test Engr: LD ___ Date: 4/24/00
Quality: ___ TA 268

B58

Y=16.5783   ΔY=18.1mV

+5% limit

Overshoot = 0.0 mV

Scan Motion and Jitter
TP 3.4.5.5
Step 29-30

S/O: 335/68
P/N: 133/200-2-IT
S/N: 108.

Test Engr.: [signature]   Date: 4/4/91
Quality: (7A 268)

B59

X=6.033 S   ΔX=210.2mS   Y=20.3132   ΔY=34.18mV
Ya=16.5864   ΔYa=3.753 V

CAP TIM BUF
20.9

588
mV
Div

Real

V

16.2

FxdXY 6.01   Sec   7AP FSS   6.68

S6: 335/68
P/N: 1331200-2-IT
S/N: 108

Scan Motion and Jitter   Test Engr: ___ Date: 4/21/92
TT 3.4.5.5   Quality: ___
Step 30 - Cold Cal

860

X=7.036 S ΔX=400.0mS Y=30.78 ΔY=36.67mV
Ya=30.7871 ΔYa=10.45 V
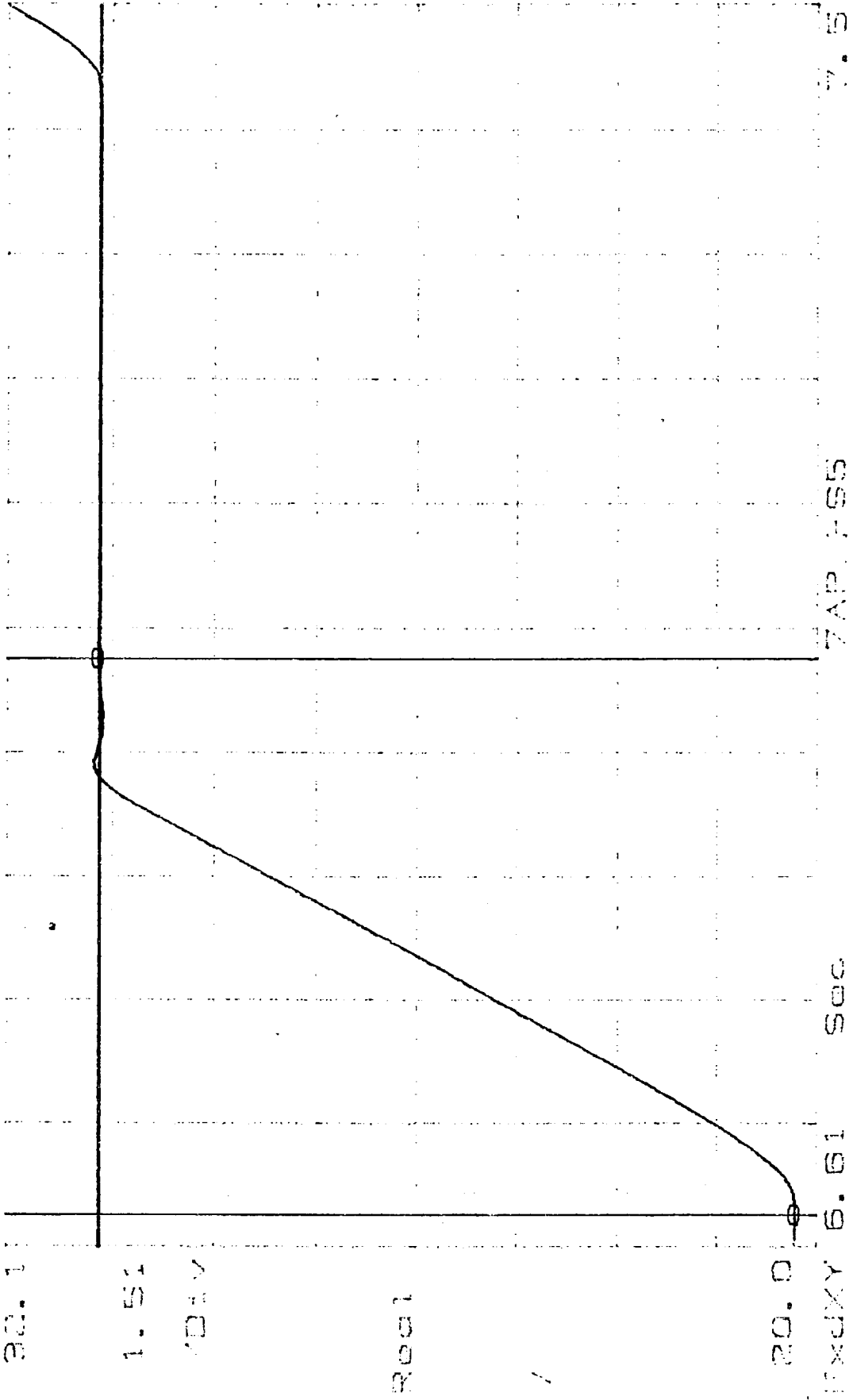
CAP TIN 30i
38.1

1.51
DIV

Real

20.0

ExdXY 6.61

Sec

7AP :-55

7.5

S/O: 335168
P/N: 1331200-2-IT
S/N: 108

Scan Motion and Jitter
77 3,4,5,5
Step Cold Cal - Warm Cal

Test Engr:
Quality: 268 M

Date: 4/2/99

B61

TEST DATA SHEET 7 (SHEET 1 OF 4)
3.4.5.5: METSAT Scan Motion and Jitter Test

Test Setup Verified: _D Lund_   Shop Order No. _335168_
                    Signature

Step No.	Description	Requirement	Test Result	Pass/Fail
7	--	Stepping Slewing <8 sec period per Figure 25	< 8 sec	P
9	Scene 1-2 3.33° step	<42 msec rise time per Figure 26	39.06 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 0.691% 0.0%	P P
10	Scene 2-3 3.33° step	<42 msec rise time per Figure 26	39.06 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.025% 0.0%	P P
11	Scene 3-4 3.33° step	<42 msec rise time per Figure 26	41.8 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 0.873% 0.0%	P P
12	Scene 4-5 3.33° step	<42 msec rise time per Figure 26	38.28 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.654% 0.0%	P P
13	Scene 5-6 3.33° step	<42 msec rise time per Figure 26	41.02 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.48% 0.0%	P P
14	Scene 6-7 3.33° step	<42 msec rise time per Figure 26	37.5 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 2.09% 0.0%	P P
15	Scene 7-8 3.33° step	<42 msec rise time per Figure 26	39.06 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.01% 0.0%	P P
16	Scene 8-9 3.33° step	<42 msec rise time per Figure 26	39.06 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.45% 0.0%	P P

Pass = P
Fail = F

B62

TEST DATA SHEET 7 (SHEET 2 OF 4)
3.4.5.5: METSAT Scan Motion and Jitter Test

Step No.	Description	Requirement	Test Result	Pass/Fail
17	Scene 9-10 3.33° step	<42 msec rise time per Figure 26	40.23 mSec	P
		< ±5% jitter per Figure 26	± 1.61%	P
		< +4% overshoot for 19 msec	0.0%	P
18	Scene 10-11 3.33° step	<42 msec rise time per Figure 26	41.8 mSec	P
		< ±5% jitter per Figure 26	± 1.74%	P
		< +4% overshoot for 19 msec	0.0%	P
19	Scene 11-12 3.33° step	<42 msec rise time per Figure 26	41.41 mSec	P
		< ±5% jitter per Figure 26	± 1.38%	P
		< +4% overshoot for 19 msec	0.0%	P
20	Scene 12-13 3.33° step	<42 msec rise time per Figure 26	39.84 mSec	P
		< ±5% jitter per Figure 26	± 1.04%	P
		< +4% overshoot for 19 msec	0.0%	P
21	Scene 13-14 3.33° step	<42 msec rise time per Figure 26	41.8 mSec	P
		< ±5% jitter per Figure 26	± 1.06%	P
		< +4% overshoot for 19 msec	0.0%	P
22	Scene 14-15 3.33° step	<42 msec rise time per Figure 26	39.06 mSec	P
		< ±5% jitter per Figure 26	± 1.99%	P
		< +4% overshoot for 19 msec	0.0%	P
23	Scene 15-16 3.33° step	<42 msec rise time per Figure 26	41.02 mSec	P
		< ±5% jitter per Figure 26	± 1.37%	P
		< +4% overshoot for 19 msec	0.0%	P
24	Scene 16-17 3.33° step	<42 msec rise time per Figure 26	41.41 mSec	P
		< ±5% jitter per Figure 26	± 1.45%	P
		< +4% overshoot for 19 msec	0.0%	P

Pass = P
Fail = F

B62

TEST DATA SHEET 7 (SHEET 3 OF 4)
3.4.5.5: METSAT Scan Motion and Jitter Test

Step No.	Description	Requirement	Test Result	Pass/Fail
25	Scene 17-18 3.33° step	<42 msec rise time per Figure 26	41. 41mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.55% 0.0%	P P
26	Scene 18-19 3.33° step	<42 msec rise time per Figure 26	41.8 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 0.893% 0.0%	P P
27	Scene 19-20 3.33° step	<42 msec rise time per Figure 26	40.62 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.156% 0.0%	P P
28	Scene 20-21 3.33° step	<42 msec rise time per Figure 26	41.02 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.39% 0.0%	P P
29	Scene 21-22 3.33° step	<42 msec rise time per Figure 26	41.8 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.58% 0.0%	P P
30	Scene 22-23 3.33° step	<42 msec rise time per Figure 26	41.41mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.68% 0.0%	P P
31	Scene 23-24 3.33° step	<42 msec rise time per Figure 26	39.84 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.98% 0.0%	P P
32	Scene 24-25 3.33° step	<42 msec rise time per Figure 26	41.41 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.11% 0.0%	P P

Pass = P
Fail = F

B62

TEST DATA SHEET 7 (SHEET 4 OF 4)
3.4.5.5: METSAT Scan Motion and Jitter Test

Step No.	Description	Requirement	Test Result	Pass/Fail
33	Scene 25-26 3.33° step	<42 msec rise time per Figure 26	41.8 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.92% 0.0%	P P
34	Scene 26-27 3.33° step	<42 msec rise time per Figure 26	40.23 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.88% 0.0%	P P
35	Scene 27-28 3.33° step	<42 msec rise time per Figure 26	41.8 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.47% 0.0%	P P
36	Scene 28-29 3.33° step	<42 msec rise time per Figure 26	41.41 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.68% 0.0%	P P
37	Scene 29-30 3.33° step	<42 msec rise time per Figure 26	40.23 mSec	P
		< ±5% jitter per Figure 26 < +4% overshoot for 19 msec	± 1.80% 0.0%	P P
38	Scene 30- Cold Cal 35.0° slew	<0.21 sec slew time per Figure 29	< 0.21 Sec	P
		< ±5% jitter per Figure 30	< ± 5%	P
39	Cold Cal - Warm Cal 96.67° slew	<0.40 sec slew time per Figure 31	< 0.40 Sec	P
		< ±5% jitter per Figure 32	< ± 5%	P

Pass = P
Fail = F

Unit: 1331200-2-IT

Serial No.: 108

Date: 4/21/99

Test Engineer:

Quality Assurance:

Customer Representative: 5/5/99

B62

X=6.1691 Sec   Y=40.0363m   ΔY=2.036mV
Ya=39.7694mV

CAP TIM BUF
70.0 m

10.0 m
/Div

500 mA/10mV

$I_{PK} = 39.769mV \left(\frac{500mA}{10mV} \right) = 1.988mA$

Real

V

-10 m

FxdXY 0.0

Sec

8.0

28V PLB Peak Current
File: 4PLB_C
P 3.4.5.6

4PLB_C

Test Engr: _____ Date: 4/23/99
Quality: _____

S/O: 335168
P/N: 133/200-2-IT
S/N: 108

C.1

TEST DATA SHEET 8
3.4.5.6: METSAT Pulse Load Bus Current

Test Setup Verified: _____   Shop Order No. _33 5̄ / 6 8̄_
          Signature

3.4.5.6: 28V Bus Peak Current and Rise Time Test

Step No.	Requirement	Test Result	Pass/Fail
4	< 2 A peak any place in the scan	1.988 mA	P
5	> 70 µsec rise time, 3.33° step	2.34 mSec	P
6	> 70 µsec rise time, start of WC slew	2.43 mSec	P
6	> 70 µsec rise time, end of WC slew	2.34 mSec	P

Pass = P
Fail = F

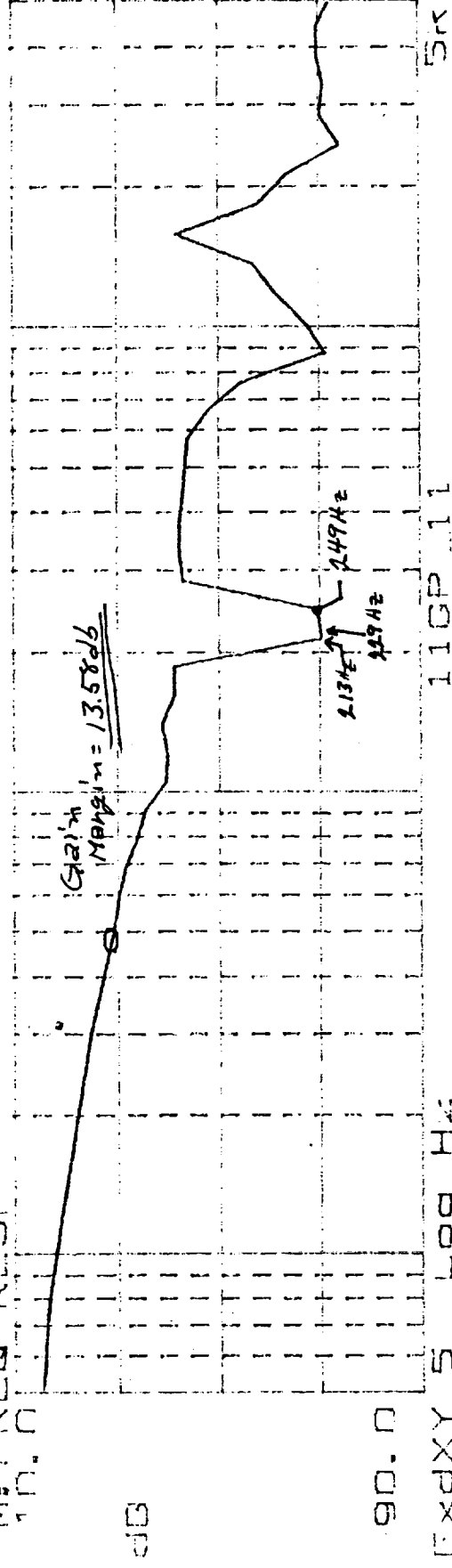Unit: _1331200 - 2 -IT._   Test Engineer: _____

Serial No.: _108_   Quality Assurance: _____

Date: _4/23/99_

X=48.025 Hz
Ya=-13.582 dB
M:FREQ RESP
10.0

dB

90.0

FxdXY 5 Log Hz
Yb=-180.65 Deg
M:FREQ RESP
90.0

Phase

Deg

-720

FxdXY 5 Log Hz

5k

11GP_11

Gain Margin = 13.58db

2.134Hz
2.49Hz
2.49Hz

5k

11GP_11

Gain Phase Margin Test
IT 3,4,5,8
File: 11GP_11

TestEngr: _____ Date: 4/9/99
Quality: _____
268
44

S/O: 335768
P/N: 1331200-2-IT
S/N: 108

D1

X=9.8905 Hz
Ya=11.383mdB
M:FREQ RESP
10.0
dB
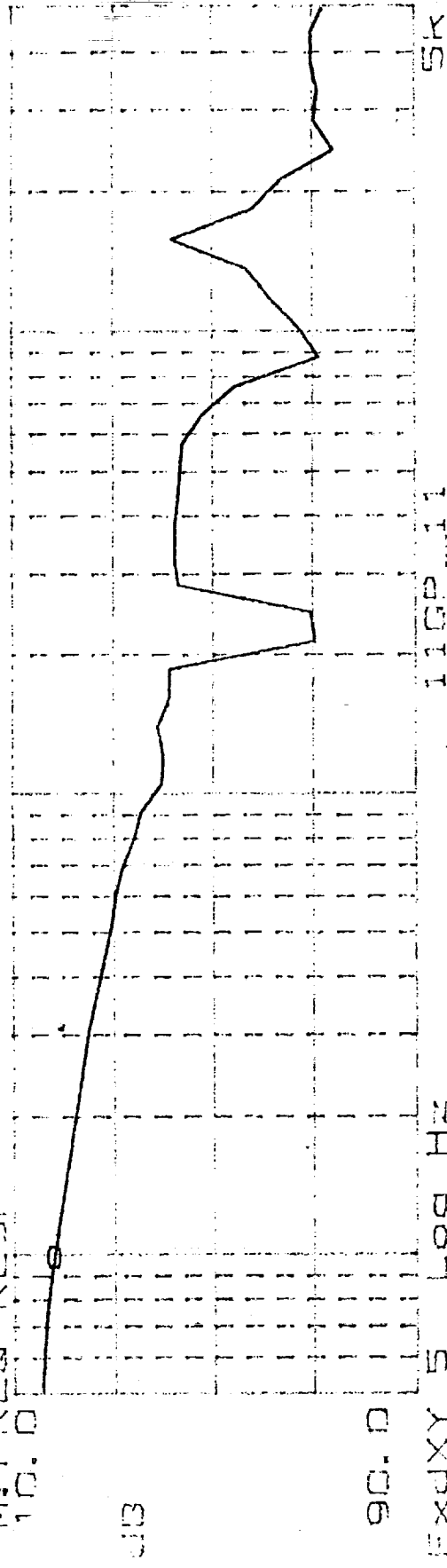
EXdXY 5 Log Hz
Yb=-115.5 Deg
M:FREQ RESP
90.0
90.0

11GP_11   5K

Phase Margin = 180-115.5 = 64.5°

Phase
Deg
-720

FxdXY 5 Log Hz

11GP_11   5K

S/O: 335168
P/N: 1331200-2-IT
S/N: 108

Gain Phase Margin Test
TP 3.4.5.8
File: 11GP_11

Test Engr: _____ Date: 4/9/97
Quality: _____

268
AR

DC

Gain Phase Margin Test

X=47.612 Hz
Ya=-13.582 dB

M:FREQ RESP
10.0

Gain Margin = 13.58db

dB

90.0
FxdXY 5 Log Hz
Yb=-180.15 Deg

M:FREQ RESP
90.0

12GP_21   5k

Phase

Deg

-720
FxdXY 5 Log Hz   5k

12GP_21

FxdXY 5 Log dB

s/o: 335/168
P/N: 1331200-2-IT
s/N:108

Gain Phase Margin Test
R 3.4.5.8
File: 12GP_21

Test Engr: [signature] Date: 4/8/99
Quality: (7A 868)

D3

X=9.8905 Hz
Ya=-4.1697mdB
HM:FREQ RESP
10.0

dB

-90.0

FxdXY 5 Log Hz
Yb=-115.85 Deg
HM:FREQ RESP
90.0

12GP_21

5K

Phase Margin = 180 - 115.85 = 64.15°

Phase

Deg

-720

FxdXY 5 Log Hz

12GP_21

5K

Gain Phase Margin Test
TT 3.4.5.8
File: 12GP_21

Test Engr: [signature] Date: 4/19/99
Quality: (269)

S/O: 335168
P/N: 1331200-2-IT
S/N: 108

D4

X=48.025 Hz
Ya=-13.643 dB
M:FREQ RESP
10.0

Gain Margin = 13.64db

dB

90.0
FxdXY 5 Log Hz
Yb=-181.0 Deg
M:FREQ RESP
90.0

12GP_31

Phase

Deg

-720
FxdXY 5 Log Hz

12GP_31

5k

5k

S/O: 335/68
P/N: 133/200-4-IT
S/N: 108

Gain Phase Margin Test
P 3.4.5.8

File: 12GP_31

Test Engr.: [signature] Date: 4/19/99
Quality: [signature]

D5

X=9.8905 Hz
Ya=11.6627mdB
FM:FREQ RESP
10.00

dB

-90.0
FxdXY 5 Log Hz
Yb=-115.81 Deg
FM:FREQ RESP
90.0

12GP_31

Phase Margin = 180 - 115.81 = 64.19°

Phase

Deg

-720
FxdXY 5 Log Hz

12GP_31

S/O: 335168
P/N: 133/200-2-IT
S/N: 108

Gain Phase Margin Test
T 3.4.5.8
File: 12GP_31

Test Engr: [signature] Date: 4/19/99
Quality:

D6

TEST DATA SHEET 9
3.4.5.8: METSAT Gain/Phase Margin Test

Test Setup Verified: _O Lund_   Shop Order No. _335168_
          Signature

3.4.5.8 Step 12: Gain/Phase Margin Test

Requirement		Test Result	Pass/Fail
12 dB minimum	1	13.58	P
	2	13.58	
	3	13.64	
25 degrees minimum	1	64.50	P
	2	64.15	
	3	64.19	

Pass = P
Fail = F

Unit: _1331200-2_   Test Engineer: _O Lund_

Serial No.: _108_   Quality Assurance: _(7A 268)_

Date: _4/19/99_   Customer Representative: _F. Falacgau_
                                                            _5/5/99_

X=78.12 Hz $\qquad$ Y=10.0 $\qquad$ ΔY=80.0
Ya=-35.536 dBVrms

POWER SPEC2 $\qquad$ 3Avg $\qquad$ 0%Ovlp $\qquad$ Unif
10.0
10.0

/Div

$$\text{Gain Margin (db)} = 20\log \frac{1 + \dfrac{R58+Rpot}{2K}}{1 + \dfrac{R58}{2K}} = 20\log \frac{1 + \dfrac{18.266+40.315K}{2K}}{1 + \dfrac{18.266K}{2K}} = 9.51\,db$$

dB

rms
V2

-70.0
FxdXY 0 Hz $\qquad$ 120 PSI

S/O: 335/68
P/N: 133/200-2-IT
S/N: 108

Operational Gain Margin Test
3,4,5,9
Run #1

Test Engr: _____ Date: 4/24/9_
Quality: _____

E1

TEST DATA SHEET 10
3.4.5.9: METSAT Operational Gain Margin Test

Test Setup Verified: _D Lund_   Shop Order No. _335168_
　　　　　　　　Signature

3.4.5.9: Operation Gain Margin Test

Step No.	Requirement		Test Result	Pass/Fail
11	R58 Resistance (Kohms)		18,266 K	P
	Test Pot Resistance (Kohms)	1	40,315 K	
		2	40,877 K	
		3	39,805 K	
12	Oscillation Frequency (Hz)	1	78,12 Hz	P
		2	77.73 Hz	
		3	77.73 Hz	
16	Gain Margin, 9 dB minimum	1	9.51 db	P
		2	9.59 db	
		3	9.44 db	

Pass = P
Fail = F

Unit: _133 1200-2-IT_   Test Engineer: _D Lund_

Serial No.: _108_   Quality Assurance: _(TA 268)_

Date: _4/22/99_

E2

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Report Documentation Page

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15. Supplementary Notes

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16. ABSTRACT (*Maximum 200 words*)

This is the Performance Verification Report, Antenna Drive Subassembly, Antenna Drive Subsystem, METSAT AMSU-A2 (P/N 1331200-2, SN: 108), for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A).

17. Key Words (Suggested by Author(s))	18. Distribution Statement
EOS Microwave System	Unclassified --- Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of pages	22. Price
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6. AUTHOR(S) C. Haapala	

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Aerojet 1100 W. Hollyvale Azusa, CA 91702	8. PERFORMING ORGANIZATION REPORT NUMBER 11486 4 August 1999

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11. SUPPLEMENTARY NOTES   ---

12a. DISTRIBUTION/AVAILABILITY STATEMENT ---	12b. DISTRIBUTION CODE ---

13. ABSTRACT (*Maximum 200 words*)

This is the Performance Verification Report, Antenna Drive Subassembly, Antenna Drive Subsystem, METSAT AMSU-A2 (P/N 1331200-2, SN: 108), for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A).

14. SUBJECT TERMS EOS Microwave System		15. NUMBER OF PAGES
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17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT SAR

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